REPORT TO CONGRESS

HIGH VOLUME AND HIGH PAYMENT PROCEDURES IN THE MEDICAID POPULATION

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TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	ES-1
SECTION 1. INTRODUCTION	1-1
1.1 Purpose of the Research	1-1
1.2 The Congressional Mandate	1-2
SECTION 2. RESEARCH APPROACH	2-1
2.1 Overview of Research Activities	2-1
2.2 Overview of Methods Used with Claims Data	2-2
2.2.1 Data Sources	2-2
2.2.2 Unit of Analysis	2-6
2.2.3 Measurement	2-7
2.3 Organization of Research Results	2-12
SECTION 3. RESEARCH RESULTS, HIGH VOLUME AND HIGH PAYMENT PROCEDURES	3-1
3.1 Inpatient Procedures	3-4
3.1.1 High Volume Procedures	3-4
3.1.2 High Average Payment Procedures	3-18
3.1.3 High Aggregate Payment Procedures	3-26
3.2 Outpatient Procedures	3-34
3.2.1 High Volume Procedures	3-34
3.2.2 High Average Payment Procedures	3-40
3.2.3 High Aggregate Payment Procedures	3-48
SECTION 4. RESEARCH RESULTS, ISSUES IN ACCESS	4-1
SECTION 5. RESEARCH RESULTS, CANDIDATE PROCEDURES FOR A MANDATORY SECOND SURGICAL OPINION PROGRAM	5-1
SECTION 6. SUMMARY AND CONCLUSIONS	6-1

APPENDICES

A. Background on Second Opinion Programs

B. Survey on Current Programs

C. Technical Appendix, Use of Claims Data

D. Procedure Coding Tables

E. Data Tables for All Procedures

F. Characteristics of Tape-to-Tape States

REFERENCES

EXECUTIVE SUMMARY

Under section 9432(b) of the Omnibus Budget Reconciliation Act of 1986, Congress mandated that the Secretary of the Department of Health and Human Services provide information pertaining to second surgical opinion and preadmission review programs in the Medicaid program. The mandate can be broken down into three basic topics. First, it requires information such as payment rates, aggregate payments, and rates of performance for high volume and high cost surgical procedures in the Medicaid population. The second request was for information on the extent to which second surgical opinion or preadmission review programs may impede access to necessary care and the measures States have taken to address such impediments. Third, the mandate states that the Secretary should identify surgical procedures that may be appropriate for a mandatory second surgical opinion program under Medicaid, considering factors about the procedures such as potential risk, volume, cost, nonconfirmation rates, and geographic variation. This report responds to this congressional mandate.

To address these topics we engaged in several research activities. We reviewed and synthesized existing literature on second surgical opinion and preadmission review programs. We also conducted a survey of all State Medicaid agencies to obtain information on second opinion and preadmission review programs currently in operation. Finally, we obtained all claims paid by Medicaid for a sample of States (Georgia, Michigan, and Tennessee), including information on procedures performed and payments made by Medicaid.

In response to the first topic raised in the mandate, we analyzed the claims data to produce information on surgical procedures that were high in volume or high in average payment or high in aggregate payment in the Medicaid population. We studied inpatient and outpatient procedures separately. With respect to inpatient procedures, several points stand out. We found substantial overlap among our sample States in the inpatient procedures that were high in volume, and obstetric procedures were prominent on the lists. In addition, the overall inpatient volume tends to be concentrated in a few procedures. The top ten procedures in terms of volume accounted for between 50 and 63 percent of the total volume of inpatient procedures in our sample States. Though there was substantial overlap in the procedures that appeared on the high volume lists, variation in actual rates of performance among the sample States and the national comparison group was also evident.

Major operations of the cardiovascular system were prominent on the list of high average payment inpatient procedures. There was quite a bit of variation in actual average payments, with the payments in Michigan higher than in the other two States.

Though not as great as with the high volume list, there was still considerable overlap between the States in inpatient procedures that were high in aggregate payment. A procedure can be high in aggregate payment because it is high in volume, or high in average payment, or moderate to high in both. In our sample States, the high aggregate payment inpatient procedures tended to be procedures that were high in volume. Finally, inpatient aggregate payments were concentrated in a few procedures. The top ten procedures in terms of aggregate payment accounted for between 39 and 54 percent of the total payments for inpatient procedures in our sample States.

Several additional points stand out from our analysis of high volume and high payment outpatient procedures. We found a sizeable overlap between the sample States in the procedures that were high in volume, and the top ten procedures accounted for a large share of the overall outpatient volume in the States (between 61 and 68 percent). However, the high volume outpatient procedures tended to be very low in average payment; many of these procedures were probably associated with minor accidents and the like.

The overlap in outpatient procedures that were high in average payment was not as great as for the high volume procedures. Procedures on the eyes were notable on this list.

The top ten aggregate payment procedures accounted for a large share of the total payments for all outpatient procedures in our sample States (between 47 and 56 percent). Procedures that were on the high aggregate payment lists also tended to appear on the high volume lists, though not to the extent seen on the inpatient side.

Note that the sample of States used in the analysis above is not necessarily representative of all State Medicaid programs. The data for our sample States were included in the Health Care Financing Administration's Tape-to-Tape data base and were the only claims-level Medicaid data that were readily available. Although not necessarily representative, results from this sample of States can still provide a useful general indicator of the high volume and high payment procedures that may be found in the Medicaid population.

In response to the second topic raised in the mandate, we found that the literature is sparse on the extent to which mandatory second opinion programs impede access to necessary care. We did not find evidence that these programs do impede access, but firm conclusions cannot yet be drawn.

States often attempt to address potential impediments by including waivers in their program under which a person recommended for surgery is not required to obtain a second opinion. We found waivers granted under the following conditions in one or more current programs: the patient is in pain or at risk; the patient is too far from a provider; the patient is enrolled in a managed care program; the patient is eligible for Medicare; the patient is determined to be Medicaid eligible after the surgery is performed; a qualified physician or specialist is unavailable; obtaining the second opinion would cause some severe hardship; the patient is covered under private insurance and has obtained a second opinion under this insurance; the procedure is incidental to a more major procedure.

In response to the third topic in the mandate, we attempted to identify procedures that may be appropriate for a mandatory second surgical opinion program by examining procedures that are included in second opinion programs currently in operation in State Medicaid plans. A total of 38 procedures were included in one or more current programs. We found that this list of procedures reasonably addressed the major criteria suggested in the mandate: it represents procedures that the States believe can be postponed without undue risk to the patient; it overlaps with the lists of high volume and high payment procedures identified in our analysis of Medicaid claims data (eight of the ten procedures that appeared in three or more current programs also appeared on one of the high volume or high payment lists — cataract extraction, cholecystectomy, dilation and curettage, hernia repair, hysterectomy, joint replacement, spinal fusion, tonsillectomy/adenoidectomy); and nonconfirmation rates were not so low that it was obvious that procedures should be excluded from the list. Thus, although the 38 procedures on this list are not

exhaustive nor are all of them necessarily applicable in all States, they do represent a reasonable pool of potential procedures that may be appropriate for a mandatory second surgical opinion program.

SECTION 1. INTRODUCTION

1.1 Purpose of the Research

Expenditures in the Medicaid program have increased dramatically in the 1980's, and payments associated with surgery have played an important part. Total payments for inpatient and outpatient hospital care increased from $7.5 billion in 1980 to $12.4 billion in 1986, and payments for physician services increased from $1.9 billion to $2.5 billion over the same period (Health Care Financing Administration, 1988). If, as is estimated, one-third of hospital and physician costs are related to surgery (Roenigk and Bartlett, 1982), then payments for surgery may have increased from approximately $3.1 billion to $5.0 billion. The 1986 payments for surgery would represent 12 percent of all Medicaid expenditures. Though this is only a rough estimate, it is clear that payments associated with surgery are an important part of Medicaid expenditures.

In an attempt to control such payments, a number of States have instituted mandatory second surgical opinion or preadmission review programs. Under a mandatory second opinion program, patients recommended for surgery are required to obtain independent medical opinion prior to the performance of the procedure. It is argued that this requirement can hold down payments as well as improve the quality of care by reducing questionable or unnecessary surgery.

In order for a mandatory second opinion program to be cost effective, however, it must be targeted on certain surgical procedures. It would not be efficient to require second opinions for all recommended surgeries. A

number of criteria can be used to identify procedures for inclusion in a mandatory second surgical opinion program. Procedures that are high in volume or high in average or aggregate payment are often likely candidates for inclusion in such programs. To date, however, little research has been done in identifying high volume and high payment procedures in the Medicaid population. Under section 9432(b) of the Omnibus Budget Reconciliation Act of 1986 (OBRA-86), Congress mandated that the Secretary of the Department of Health and Human Services further study issues pertaining to second surgical opinion and preadmission review programs, particularly focusing on obtaining information on high volume and high cost procedures performed on the Medicaid population. This report responds to that mandate. The exact content of the mandate is presented below.

1.2 The Congressional Mandate

In section 9432(b) of OBRA-86, Congress specified the following:

> (1) The Secretary shall report to Congress, by no later than October 1, 1988, for each State in a representative sample of States —
>
> (A) the identity of those procedures which are high volume or high cost procedures among patients who are covered under the State medicaid plan,
>
> (B) the payment rates under those plans for such procedures, and the aggregate annual payment amounts made under such plans for such procedures (including the Federal share of such payment amounts),
>
> (C) the rate at which each such procedure is performed on medicaid patients and (to the extent that data are available) comparisons to the rate at which such procedure is performed on patients of comparable age who are not medicaid patients,
>
> (D) with respect to each such procedure —
>
> (i) the number of board certified or board eligible physicians in the State who provide care and services to medicaid patients and who perform the procedures, and
>
> (ii) in the case of a State with a mandatory second surgical opinion program in operation, the number of

physicians described in clause (i) who provide second opinions (of the type described in section 1164 of the Social Security Act) for the procedure at prevailing payment rates under the State medicaid plan, and

(E) in the case of a State with a mandatory second surgical opinion program or a program of inpatient hospital preadmission review in operation, a description of —

(i) the extent to which such program impedes access to necessary care and services, and

(ii) the measures that the State has taken to address such impediments, particularly in rural areas.

(2) Such report shall also include a list of those surgical procedures which the Secretary believes meet the following criteria and for which a mandatory second surgical opinion program under medicaid plans may be appropriate:

(A) The procedure is one which generally can be postponed without undue risk to the patient.

(B) The procedure is a high volume procedure among patients who are covered under State medicaid plans or is a high cost procedure.

(C) The procedure has a comparatively high rate of nonconfirmation upon examination by another qualified physician, there is substantial geographic variation in the rates of performance of the procedure, or there are other reasons why requiring second opinions for 100 percent of such procedures would be cost effective.

(3) The representative sample of States required to be included in the report shall include States with mandatory second surgical opinion programs in operation, States with programs of inpatient hospital preadmission review in operation, and States with neither such program in operation.

(4) In this subsection, the term "medicaid plan" means a State plan approved under title XIX of the Social Security Act.

In this report we will present information on the issues raised in the mandate. Note, however, that we were not able to fully address all of the topics in the mandate. First, the mandate states that we should present the rates at which procedures are performed on Medicaid patients and on a non-Medicaid comparison group (see paragraph 1C.). We present these rates, but with the time and information currently available, we were not able to perform a thorough analysis of possible reasons for differences observed. Section 9432(c) of OBRA-86 mandated a companion study to the present report that will further research the utilization of procedures in the Medicaid population. In that study, which is due to

Congress January 1, 1990, we will perform a more indepth analysis of such utilization differences.

Second, the mandate states that, for each high volume and high cost procedure, we should provide the number of board certified or board eligible physicians who perform the procedure and the number of physicians who provide second opinions for the procedure. Data were not available to address these issues fully. We could obtain a very rough count of the number of providers who performed each procedure, but the data are questionable in a number of ways (see Section 2.2.3 for details). We therefore simply present the counts we obtained with the strong caveat that the data should be interpreted with caution. We were not able to determine the board certification or board eligibility of these providers, nor were we able to determine separately by procedure the number of physicians who provide second opinions.

Third, the mandate states that we should obtain data on high volume and high cost procedures for a representative sample of States that cover several specific strata (see paragraph 3). The data for our analysis of the procedures came from the Health Care Financing Administration's (HCFA's) Tape-to-Tape project and included information for Georgia, Michigan and Tennessee. While this sample of States cannot be viewed as being representative of all Medicaid programs and only approximates the strata requested in the mandate, it is the only data source for which claims-level Medicaid data were readily available. Though not necessarily nationally representative, results from this sample of States can still provide a useful general indicator of the high volume and high payment procedures in Medicaid.

SECTION 2. RESEARCH APPROACH

2.1 Overview of Research Activities

To address the questions in the mandate we engaged in three basic research activities. First, we reviewed and synthesized existing literature on second surgical opinion and preadmission review programs to provide background and context for our analysis. Our review and synthesis is presented in Appendix A and is organized into the following topics: literature on Medicaid second opinion programs, literature on non-Medicaid second opinion programs, other topics relevant to second opinion programs, and a history of congressional interest in second opinion programs.

Second, we conducted a survey of State Medicaid agencies to obtain information on the basic characteristics of second surgical opinion and preadmission review programs currently in operation. Questionnaires were sent to all 50 State Medicaid agencies and the District of Columbia, and we received responses from 45 States (response rate of 88 percent). We obtained information on topics such as: which States currently have second surgical opinion or preadmission review programs, for which procedures do States require second opinions, what does the Medicaid agency require if the second opinion does not confirm the first opinion, and the like. A detailed description of the survey methods and results is presented in Appendix B.

Third, we obtained all claims paid by Medicaid for a sample of States. These data contain information on procedures performed and payments made by Medicaid. Using these data we were able to produce information on high volume and high payment procedures in the Medicaid

population in these States. To help the reader understand results that will be presented later, we next present an overview of the methods we used in our analysis of the claims data. Appendix C gives full detail on our methodology.

2.2 Overview of Methods Used with Claims Data

2.2.1 Data Sources

The mandate calls for information on high volume and high cost procedures in the Medicaid population for a sample of States and for the rates at which such procedures are performed on patients of comparable age who are not Medicaid patients. Our data for the Medicaid population came from HCFA's Tape-to-Tape Project, and our data for the non-Medicaid comparison group came from the National Hospital Discharge Survey (NHDS). We discuss each data source below.

The Tape-to-Tape Project. HCFA sponsors an ongoing data project, called the Tape-to-Tape Project, that collects detailed Medicaid information for a sample of States -- California, Georgia, Michigan, New York, and Tennessee. The data base contains information on all Medicaid claims, enrollees, and providers in the sample States. The claims files provide the basic data for our analysis.

The project currently has claims data for the years 1980-1984 (except for New York, see below). For our analysis of high volume and high payment procedures we used only the most recent data (i.e., data for 1984).

Unfortunately we could not use the data from all of the States. The California data could not be used because no procedure codes are available in the claims files, and therefore we could not obtain volume or payment information for separate procedures. New York dropped out of the Tape-to-Tape Project in 1982, so we had no data for this State in 1984. In addition, the data we have in 1982 for New York are only partial in that we do not have Medicaid claims for October through December of 1982, and not all counties are included (Erie and Suffolk counties are missing). We therefore did not include New York in our analyses. The States included in our basic analysis sample thus are Georgia, Michigan and Tennessee. Appendix F presents details on the characteristics of the Medicaid programs of these States.

Paragraph 3 of the mandate asks that the sample of States used in the analysis include States with a mandatory second surgical opinion program in operation, States with programs of inpatient hospital preadmission review in operation, and States with neither such program in operation. Our sample States approximate this request. Michigan had a second surgical opinion program in operation in 1984 (it also began a preadmission review program in October of 1984); Georgia had an inpatient hospital preadmission review program in operation in 1984; and Tennessee had neither program in operation through most of 1984 (it implemented a second surgical opinion program in October of 1984).

While this sample of States cannot be viewed as being representative of all Medicaid programs, and only approximates the strata requested in the mandate, it is the only data source for which claims-level Medicaid data are readily available. Though not necessarily representative, results from this sample of States can provide a useful general indicator of the high volume and high payment procedures in Medicaid.

In generating our analysis files we restricted the data base for our sample States in a number of ways. The Tape-to-Tape claims files contain all claims paid by Medicaid in the State. This includes claims paid for persons enrolled in both Medicare and Medicaid. We removed claims for this crossover population from the data base for the following reasons: (1) Medicare is the first payor for persons enrolled in both Medicare and Medicaid and, therefore, the Medicaid payment amounts on these claims primarily represent only coinsurance and deductible payments; (2) Medicare beneficiaries may not be obligated to follow the second opinion regulations established by Medicaid; and (3) in Georgia and Tennessee the claims for the crossover population do not include detail information (e.g., procedure performed), so we could not break down volume and payment by procedure as called for in the mandate.

We further restricted the data base because certain types of claims were not relevant to the focus of the analysis. The Tape-to-Tape Project contains claims for inpatient care, outpatient care, long-term care and home health, dental care, and prescription drugs. For the purposes of this study, inpatient hospital and outpatient claims are most relevant and were selected for the analysis. Inpatient and outpatient claims can be further categorized into claims associated with medical treatments and claims associated with procedures. The focus of the mandate is on obtaining information on procedures, especially in relation to second surgical opinion programs (see paragraphs 1A. through 1D. and paragraph 2.). Thus only inpatient and outpatient claims associated with procedures were selected.

In summary, the data base we used in our analysis consists of all inpatient and outpatient claims associated with stays for procedures paid by Medicaid for the noncrossover population in Georgia, Michigan and Tennessee in 1984.

NHDS. The data source for the comparison group called for by the mandate is the NHDS that is conducted annually by the National Center for Health Statistics (NCHS). NHDS data for 1984 were selected because extensive discussions with both national and State data organizations revealed that non-Medicaid claims-level data were not readily available for the Tape-to-Tape States.

The NHDS contains information on hospital discharges for nearly 200,000 patients who received care in U.S. short-stay hospitals. The data obtained from the survey include demographic information on the patient (e.g., age and sex) as well as information on procedures performed during the hospital stay. The NHDS does not contain data on procedures performed on an outpatient basis.

Recall that we excluded information from the Tape-to-Tape data base for persons enrolled in both Medicare and Medicaid. To make the data sets comparable, we excluded information for persons age 65 and over from the NHDS data. The disabled can also be enrolled in both Medicare and Medicaid, but we were not able to identify discharges for such persons in the NHDS.

The mandate states that we should compute rates at which each high cost and high volume procedure is performed on patients who are not covered by Medicaid. Unfortunately, for technical reasons we were not able to compute rates of performance for a strictly non-Medicaid

population (see Appendix C for details). The comparison data comprise hospital stays from the NHDS for all patients under age 65, and thus contain information on Medicaid patients. It is notable, however, that only 10 percent of all hospital stays for patients under age 65 are for Medicaid recipients.

2.2.2 Unit of Analysis

Claims data can be organized in a number of ways to study the volume and payments for procedures. One approach is to retain the individual claim as the unit of analysis. For example, one could define payments only in terms of physician fees and compute the average and aggregate payment for a procedure based on physician claims. A different approach is to combine services associated with a procedure to define an episode of care. Under this approach, all lab, x-ray, facility charges, physician fees, and the like associated with a procedure would be combined to form an episode of care. This approach gives a more comprehensive view of the payments for a procedure, so we adopted the episode of care as our unit of analysis.

Ideally one would want to include all services associated with a procedure in defining the episode of care for a given case. Unfortunately this is very difficult to do in practice. For example, the length of time needed to define an episode is unknown. How far back in time should one go in including claims for office visits prior to the performance of a procedure, and how does one know which visits relate to the procedure. Because of such difficulties, this study adopted a more limited approach. For procedures performed on an inpatient basis, all services provided

during the inpatient stay (i.e., all services delivered between the admission and discharge dates) are assumed to define the episode of care. For procedures performed on an outpatient basis, all services provided on the day the procedure was performed are assumed to define the episode of care. In this regard, payments for episodes may be understated since some pre- and post-surgical payments may not be included.

2.2.3 Measurement

The mandate calls for information on three basic outcome variables (payment rate, aggregate payment, and rate of performance) for procedures performed on the Medicaid population. It also calls for information on the number of physicians who perform the procedures. Below we present an overview of how these variables were measured.

Procedures. In our analysis files a primary procedure is identified for each episode of care. These procedures are coded using either the International Classification of Diseases, 9th Edition (ICD-9-CM) (Department of Health and Human Services, 1980) or the Physician's Current Procedural Terminology, 4th Edition (CPT-4) (American Medical Association, 1987). The ICD-9-CM and CPT-4 are very detailed coding systems. For example, the CPT-4 system has 10 individual codes under the general procedure of Caesarean section. In defining procedures for consideration in second surgical opinion programs, individual ICD-9-CM and CPT-4 codes are too specific, so we grouped individual codes to form more general procedure categories. We discuss how we grouped the codes to define procedure categories next.

Georgia and Michigan code inpatient procedures using the ICD-9-CM system. NCHS has developed a system for grouping individual ICD-9-CM codes into 162 general procedure categories (NCHS, 1981). We grouped the Georgia and Michigan inpatient codes into these categories.

Tennessee inpatient and outpatient procedures and Georgia outpatient procedures are coded using CPT-4. We wanted to make our analyses as comparable as possible, so we wanted to group these CPT-4 codes into categories that were similar to the categories developed for ICD-9-CM. The CPT-4 and ICD-9-CM coding systems are very different, and currently there is no standard means for translating the codes from one system to the other. It was not feasible in the time available to develop a system that would convert CPT-4 codes into all of the ICD-9-CM categories. We therefore selected a subset of the ICD-9-CM categories and attempted to map CPT-4 codes into these selected categories.

Using aggregate costs as a criterion, we chose a total of 65 inpatient and 89 outpatient categories for mapping. Study analysts, with clinical assistance, identified CPT-4 codes that fit into the selected categories. Note that although not all of the CPT-4 system was mapped into the ICD-9-CM categories, 78 percent of inpatient surgical episodes in Tennessee, 88 percent of outpatient surgical episodes in Tennessee, and 91 percent of outpatient surgical episodes in Georgia were for procedures that could be mapped into the selected categories. The methods we used for selecting categories for mapping are described in detail in Appendix C.

Michigan outpatient procedures are coded using a coding system unique to the State. However, there is an existing method for converting these codes to CPT-4 codes. The Michigan outpatient procedures codes were thus grouped into the ICD-9-CM categories as defined by the CPT-4 mapping.

The procedure categories, and the ICD-9-CM and CPT-4 codes that go into them, are presented in Appendix D.

Payment Rates. As noted above, a primary procedure was defined for each episode of care. All payments associated with the episode were assigned to this procedure. The payment rate for a given procedure is thus defined to be the average payment for those episodes in which the procedure was the primary procedure. (Average payment is equal to total payments for episodes in which the procedure is the primary procedure divided by the number of episodes in which the procedure is the primary procedure.) For example, the payment rate for appendectomy is defined to be the average payment for episodes in which an appendectomy was the primary procedure performed.

It must be noted that not all episodes of care involve only one procedure. It is not possible from our data to identify separately hospital payments that were associated with secondary procedures. We therefore assigned all payments to the primary procedure, but in so doing may overestimate the payment for that procedure in multiple-procedure episodes of care. In Appendix C we present a sensitivity analysis that examines the effect of this potential bias.

Note also that measures of average payment can be strongly affected by episodes that have payments far beyond the payments for most episodes in which the procedure was performed. We removed such outliers from our data. Episodes for which the payment was more than three standard deviations from the mean payment for all episodes that involved the procedure were excluded. These outliers were removed from all analyses.

Aggregate Payments. Our measure of the aggregate payments for a procedure is the total amount paid by Medicaid (Federal and State shares) for episodes in which the procedure was the primary procedure. For example, the aggregate payment for appendectomies is defined to be the total payments for all episodes in which an appendectomy was the primary procedure performed.

As was the case with payment rates, our measure of aggregate payments may be biased for multiple-procedure episodes of care. In Appendix C we present a sensitivity analysis of this potential effect.

Rate of Performance. In the Tape-to-Tape States, our measure of the rate at which a procedure is performed is defined to be the number of episodes in which the procedure is the primary procedure divided by the number of people ever enrolled in Medicaid in the State in 1984 (excluding those enrolled in both Medicare and Medicaid). For example, the rate of performance of appendectomy in Georgia is the number of episodes of care in which an appendectomy was the primary procedure divided by the number of Medicaid enrollees in Georgia (expressed as the number of appendectomies performed per 100,000 enrollees). For the comparison group from the NHDS, the rate at which a procedure is performed is defined to be the number of episodes in which the procedure is the primary procedure divided by the size of the U.S. population under age 65.

These measures maintain consistency with the measures of payment rates and aggregate payments by focusing on the number of episodes in which a given procedure was the primary procedure. In so doing, however, this method may underestimate the total volume of the procedure because it does not include the number of times it was performed as a secondary

procedure in multiple-procedure episodes. In Appendix C we present a sensitivity analysis that examines this potential bias.

Note an additional point about the denominator used in the calculation of the rates. As noted above, the denominator used in the calculations is the number of people ever enrolled in Medicaid in the State in 1984. This count does not take into account the fact that people may be enrolled in Medicaid only part of the year. An alternate approach is to use a count of person-years of enrollment, in which individuals are differentially weighted by their length of enrollment during the year. Because many people only become eligible for Medicaid because of medical conditions (e.g., pregnancy), we used the count of persons ever enrolled. In Appendix C we present a sensitivity analysis that examines rates based on person-years of enrollment.

In order to compare rates of performance for the Medicaid population to the rates of performance for the comparison group, we computed adjusted rates of performance for each procedure in the Tape-to-Tape States. These rates statistically adjust for age and sex differences between the Medicaid population and the population represented in the NHDS. Thus the adjusted rate of performance represents the expected rate of performance of a procedure in the State Medicaid population if the age and sex composition of this population was the same as that of the entire U.S. population under age 65. This method of adjustment, called indirect standardization, is described in detail in Appendix C.

Finally, note that we did not attempt to identify specific risk groups for the calculation of the rates. Rather, we focused on the policy issue of total program experience, and therefore present rates based on total Medicaid enrollees. For the interested reader, we present rates for specific age and sex risk groups for selected procedures in Appendix C.

Number of Physicians. The mandate states that we should present the number of board-certified and board-eligible physicians who perform high volume and high cost procedures. We were not able to determine board certification in our data, so we simply present the number of providers performing procedures.

We measured the number of providers who performed a given procedure by counting the number of unique provider identification numbers on claims for physician fees that were associated with episodes in which the procedure was the primary procedure performed. Note that this measure must be taken only as a rough indicator of the number of physicians actually performing the procedure for the following reasons: some physicians may have multiple provider identification numbers; some identification numbers pertain to groups of physicians rather than individuals; it does not include physicians, such as hospital residents, who may perform procedures but may not submit separate claims for physician fees. The extent of these biasing factors is unknown. This measure must therefore be interpreted with caution.

2.3 Organization of Research Results

The information called for in the congressional mandate can be organized into three basic topics:

- Provide information on high volume and high cost procedures in the Medicaid population (paragraphs 1.A through 1.D).
- Provide information on issues in access. Specifically, provide information on the extent to which second surgical opinion or

preadmission review programs may impede access to necessary care, and the measures States have taken to address such impediments (paragraph 1.E).

- Identify surgical procedures that may be appropriate for a mandatory second surgical opinion program, considering factors about the procedures such as potential risk, cost, volume, nonconfirmation rates, and geographic variation (paragraphs 2.A through 2.C).

We will organize our research results around these topics. In Section 3 we will present results on high volume and high payment procedures from our analysis of the claims data. In Section 4 we will discuss issues in access, drawing on our review and synthesis of the literature on second opinion programs and on our survey of State Medicaid agencies. In Section 5 we will discuss candidate procedures for a mandatory second surgical opinion program, drawing on our survey of State Medicaid agencies, our analysis of Medicaid claims, and our review of the literature on second opinion programs.

SECTION 3. RESEARCH RESULTS, HIGH VOLUME AND HIGH PAYMENT PROCEDURES

In this section we present research results on high volume and high payment procedures. The mandate requests several kinds of information with respect to these procedures: identify the procedures (paragraph 1A.); provide payment rates for these procedures (paragraph 1B.); provide aggregate payments for these procedures (paragraph 1B.); provide rates of performance for these procedures, for Medicaid patients and for a comparably aged comparison group (paragraph 1C.); provide the number of physicians who perform these procedures and the number who offer second opinions (paragraph 1D).

As noted above, the information we will present on high volume and high payment procedures is based on our analysis of claims data for the Tape-to-Tape States. We will present tables that use a common format for providing the information requested by the mandate (see Table 3.1 as an example). The first two columns identify the procedures: column (a) gives the rank of the procedure, and column (b) gives the procedure name. The next two columns give information on payment rates: column (c) gives the average payment for episodes in which the procedure was the primary procedure, and column (d) expresses this amount as a ratio to the average payment for all procedures. The next two columns give information on aggregate payments: column (e) gives the aggregate payment made by Medicaid for episodes in which the procedure was the primary procedure, and column (f) expresses this amount as a percent of payments for all procedures. The next four columns give information on rates of performance: column (g) gives the number of episodes for which the procedure was the primary procedure performed in the State's Medicaid

population, column (h) gives the rate of performance in the Medicaid population, column (i) gives the expected rate of performance in the Medicaid population after adjusting for age and sex differences between the Medicaid population and the comparison group, and column (j) gives the rate of performance of each procedure in the comparison group (i.e., in the U.S. population). The last column gives the number of providers who performed the procedures.

We will begin by presenting this information for high volume and high payment procedures performed in an inpatient setting and will then present information on procedures performed in an outpatient setting. For each setting we will present information on the top ten procedures in terms of volume and average and aggregate payments within each sample State. Information on all inpatient and outpatient procedures in each State is presented in Appendix E.

Before examining these data we give two notes of caution. First, the mandate states that we should provide comparisons between the rate at which each procedure is performed on Medicaid patients and the rate at which the procedure is performed on patients of a comparably aged comparison group (see paragraph 1C.). Comparing values in the column for "adjusted rate per 100,000 enrolled" to values in the column for "rate per 100,000, comparison group" gives this information. However, this comparison must be interpreted with caution. The adjusted rate takes into account only age and sex differences between the groups. There are many other factors, such as poverty and health status, that could differentially affect the rates in these groups that are not taken into account. Differences between adjusted rates of performance in the Medicaid population and rates of performance in the comparison group

therefore should be interpreted as reflecting only differences one would expect in rates of performance if the age and sex composition of the groups was the same. These differences should not be interpreted as necessarily reflecting over- or under-utilization of services in the Medicaid population.

Second, the mandate states that we should provide the number of physicians who perform each high volume and high cost procedure (see paragraph 1Di.). We obtained a very rough count of the number of providers who performed each procedure, but as noted in Section 2.2.3 the data are questionable in a number of ways. We therefore simply present the counts that we obtained with the strong caveat that the data should be interpreted with caution.

The mandate also states that, in the case of a State with a mandatory second surgical opinion program in operation, we should present the number of physicians who provide second opinions for each high volume and high cost procedure (see paragraph 1Dii.). Of our three sample States, only Michigan had a mandatory second surgical opinion program in operation for all of 1984. We found that a total of 450 physicians offered second opinions under this plan, but from our data we were not able to obtain the number of physicians giving second opinions separately for each procedure.

3.1 Inpatient Procedures

3.1.1 High Volume Procedures

In this section we present the information requested by the mandate for high volume inpatient procedures for our sample States. Table 3.1 presents information on high volume inpatient procedures in Georgia. Several points are especially worthy of note:

- Obstetric procedures are prominent on the list of high volume procedures in this State (procedures to assist delivery, Caesarean section). Also included are: gynecological procedures (abdominal hysterectomy, other bilateral destruction or occlusion of fallopian tubes, dilation and curettage of uterus after delivery or abortion, diagnostic dilation and curettage); procedures on the digestive system (cholecystectomy, repair of inguinal hernia, colonoscopy and other endoscopies); and procedures normally performed on children (tonsillectomy with adenoidectomy).
- By far, the category with the highest volume in this State was procedures to assist delivery.
- The rates of performance for these procedures ranged from 2,025 per 100,000 Medicaid enrollees for procedures to assist delivery to 66 per 100,000 enrollees for diagnostic dilation and curettage of the uterus.
- For only one of the ten procedures was the adjusted rate of performance in the Medicaid population higher than

Table 3.1
High Volume Inpatient Procedures in the Medicaid Population,
Georgia, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
(a) Rank	(b) Procedure	(c) Average $	(d) Ratio to Overall Average	(e) Aggregate $ (in '000)	(f) % of Total	(g) Number Performed	(h) Rate per 100,000 Enrolled	(i) Adjusted Rate per 100,000 Enrolled	(j) Rate per 100,000, comparison group	(k) Number
1	Procedures to assist delivery	2,197	.90	19,417.1	31.0	8,839	2,025	1,780	1,065	414
2	Caesarean section	2,269	.93	1,651.5	2.6	728	167	146	389	238
3	Tonsillectomy with adenoidectomy	2,001	.82	1,322.8	2.1	661	151	82	94	86
4	Abdominal hysterectomy	2,297	.94	1,281.8	2.0	558	128	129	198	109
5	Other bilateral destruction or occlusion of fallopian tubes	2,044	.84	981.1	1.6	480	110	97	100	147
6	Cholecystectomy	2,605	1.06	1,172.1	1.9	450	103	129	156	243
7	Repair of inguinal hernia	2,181	.89	809.1	1.3	371	85	124	150	165
8	Colonoscopy and other endoscopies	2,466	1.01	912.4	1.5	370	85	124	168	141
9	Dilation and curettage of uterus after delivery or abortion	1,938	.79	717.2	1.1	370	85	74	113	88
10	Diagnostic dilation and curettage	1,911	.78	552.2	0.9	289	66	66	168	120
	All procedures	2,447	1.00	62,721.2	100.0	25,631	5,873	5,780	7,195	2,593

the rate of performance in the comparison group (procedures to assist delivery). Note, however, that when the Medicaid rate is calculated based on a count of person-years of enrollment rather than a count of persons ever enrolled in the program during the year, the rates are higher in Medicaid for four procedures. See Appendix C for details.

- These ten procedures account for 51 percent of the total volume of procedures performed in the State.

Table 3.2 presents information on high volume inpatient procedures in Michigan. Note several points from this table:

- Obstetric procedures again are prominent on the list of high volume procedures (procedures to assist delivery, Caesarean section). Also included are: gynecological procedures (dilation and curettage of uterus after delivery or abortion, abdominal hysterectomy, other bilateral destruction or occlusion of fallopian tubes, intraamniotic injection for abortion); procedures on the digestive system (cholecystectomy, appendectomy, colonoscopy and other endoscopies); and procedures normally performed on children (tonsillectomy with adeniodectomy).
- The rates of performance for these procedures ranged from 913 per 100,000 Medicaid enrollees for procedures to assist delivery to 63 per 100,000 enrollees for tonsillectomy with adeniodectomy.
- For four of the ten procedures, adjusted rates of performance in the Medicaid population were higher than rates in the comparison group (Caesarean section, dilation and curettage of uterus after delivery or abortion, cholecystectomy, intraamniotic

Table 3.2
High Volume Inpatient Procedures in the Medicaid Population,
Michigan, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Procedures to assist delivery	1,984	.56	18,985.1	11.5	9,570	913	795	1,065	1,023
2	Caesarean section	3,654	1.03	21,141.6	12.8	5,785	552	487	389	1,087
3	Dilation and curettage of uterus after delivery or abortion	1,390	.39	2,086.3	1.3	1,501	143	127	113	632
4	Cholecystectomy	3,691	1.04	5,101.0	3.1	1,382	132	184	156	522
5	Abdominal hysterectomy	3,425	.97	3,702.3	2.2	1,081	103	115	198	434
6	Appendectomy, excluding incidental	2,585	.73	2,441.9	1.5	944	90	87	128	485
7	Colonoscopy and other endoscopies	4,044	1.14	3,761.9	2.3	930	89	140	168	353
8	Other bilateral destruction or occlusion of fallopian tubes	2,364	.67	2,083.8	1.3	881	84	74	100	380
9	Intraamniotic injection for abortion	1,020	.29	697.0	0.4	684	65	58	5	27
10	Tonsillectomy with adenoidectomy	1,117	.32	742.7	0.4	664	63	36	94	180
	All procedures	3,544	1.00	165,585.4	100.0	46,718	4,457	4,538	7,195	6,597

injection for abortion).

- These ten procedures account for 50 percent of the total volume of procedures performed in the State.

Note that the category intraamniotic injection for abortion appeared on the high volume list in this State. Under current Federal regulations, Federal funds can be used for abortions only if the woman's life is in danger. However, the States at their own option can cover abortions in less restrictive circumstances.

Recall also that Michigan had a mandatory second opinion program in 1984. One reason for identifying high volume procedures is that volume is one criterion that can be used to guide the selection of procedures that may be appropriate for a national mandatory second surgical opinion program. The fact that Michigan had such a program could make the use of the high volume list in this State misleading since the program could hold down the volume of procedures that it covers.

To address this issue we examined the rankings of the 17 procedures included in Michigan's second opinion program. We wanted to see if it is likely that the inclusion of these procedures in the State's second opinion program affected the list of high volume procedures. Three procedures in Michigan's plan appeared on the current high volume list (cholecystectomy, hysterectomy, tonsillectomy/adenoidectomy). If we assume that the program only acts to reduce volume, then these procedures would have appeared on the list even if the second opinion program was not in effect. The remaining 14 procedures in Michigan's second opinion program did not appear on the current high volume list. It is possible that the program reduced the volume of some of these procedures so that, if the program was not in effect, the procedure would appear on the high

volume list. In the present case this is generally unlikely. The only procedures close to the top ten were repair of inguinal hernia (ranked 12) and diagnostic dilation and curettage of the uterus (ranked 14). It is possible that these procedures would have appeared in the top ten if Michigan did not have a second opinion program. However, the remaining procedures included in Michigan's plan are not close to appearing on the list of top ten volume procedures. Thus, the current list of high volume procedures for this State can still provide useful guidance.

Table 3.3 presents information on high volume inpatient procedures in Tennessee. Several points again are especially worthy of note:

- As in the other States, obstetric procedures are prominent on the list of high volume procedures in this State (procedures to assist delivery, Caesarean section). Also included are: procedures on the digestive system (cholecystectomy, colonoscopy and other endoscopies, repair of inguinal hernia, appendectomy); gynecological procedures (other bilateral destruction or occlusion of fallopian tubes, abdominal hysterectomy); and procedures normally performed on children (tonsillectomy with adenoidectomy, tonsillectomy without adenoidectomy).
- As was the case in Georgia, the category with the highest volume by far was procedures to assist delivery. The rate of performance for this category was over four times the rate for the next highest procedure. In addition, after adjusting for differences in age and sex, the rate of performance was much higher than the rate for the comparison group.
- The rates of performance for these procedures ranged from 2,899 per 100,000 Medicaid enrollees for procedures to assist

Table 3.3
High Volume Inpatient Procedures in the Medicaid Population,
Tennessee, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Procedures to assist delivery	1,420	.66	13,300.8	26.3	9,365	2,899	2,589	1,065	430
2	Caesarean section	2,943	1.37	5,974.3	11.8	2,030	628	560	389	309
3	Other bilateral destruction or occlusion of fallopian tubes	1,839	.86	1,497.3	3.0	814	252	223	100	218
4	Tonsillectomy with adenoidectomy	952	.44	630.1	1.2	662	205	120	94	149
5	Abdominal hysterectomy	3,593	1.67	1,591.6	3.1	443	137	135	198	176
6	Cholecystectomy	3,742	1.74	1,549.3	3.1	414	128	153	156	226
7	Colonoscopy and other endoscopies	1,992	.93	792.8	1.6	398	123	164	168	150
8	Repair of inguinal hernia	1,531	.71	428.7	0.8	280	87	120	150	152
9	Tonsillectomy without adenoidectomy	979	.46	267.2	0.5	273	85	74	67	94
10	Appendectomy, excluding incidental	2,170	1.01	549.1	1.1	253	78	80	128	152
	All procedures	2,149	1.00	50,562.4	100.0	23,527	7,283	7,137	7,195	1,932

delivery to 78 per 100,000 enrollees for appendectomy.

- Five of the ten high volume procedures in this State had adjusted rates of performance that were higher than the rates for the comparison group (procedures to assist delivery, Caesarean section, other bilateral destruction or occlusion of fallopian tubes, tonsillectomy with adenoidectomy, tonsillectomy without adenoidectomy). Note that the rates for three additional procedures are higher in the Medicaid population if a count of person-years of enrollment rather than a count of persons ever enrolled in the program during the year is used in the calculation of the Medicaid rate. See Appendix C for details.
- These ten procedures account for 63 percent of the total volume of procedures performed in the State.

Table 3.4 summarizes the overlap of high volume procedures in our sample States. This table gives all procedures that appeared on the lists of high volume procedures and also gives the rank of the procedure in each State.

It is clear that there was a large overlap between the States in procedures that were high volume:

- A total of only 13 unique procedures appeared on the lists of high volume procedures in three States.
- Seven of these 13 procedures were present in all three States (tonsillectomy with adenoidectomy, colonoscopy and other endoscopies, cholecystectomy, other bilateral destruction or occlusion of fallopian tubes, abdominal hysterectomy, procedures to assist delivery, Caesarean section).
- Three of the 13 procedures were present in two of the three

Table 3.4
Overlap of High Volume Inpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Rank		
	Georgia	Michigan	Tennessee
Tonsillectomy without adenoidectomy	-	-	9
Tonsillectomy with adenoidectomy	3	10	4
Colonoscopy and other endoscopies	8	7	7
Appendectomy, excluding incidental	-	6	10
Cholecystectomy	6	4	6
Repair of inguinal hernia	7	-	8
Other bilateral destruction or occlusion of fallopian tubes	5	8	3
Abdominal hysterectomy	4	5	5
Dilation and curettage of uterus after delivery or abortion	9	3	-
Diagnostic dilation and curettage of uterus	10	-	-
Procedures to assist delivery	1	1	1
Caesarean section	2	2	2
Intraamniotic injection for abortion	-	9	-

States (appendectomy, repair of inguinal hernia, dilation and curettage of uterus after delivery or abortion).

Although there is substantial overlap in the procedures that appeared on the high volume lists, variation in actual rates of performance is also evident. Table 3.4a presents the adjusted rates of performance for procedures that appeared on the high volume lists and the corresponding rate for the comparison group. It is clear that rates of performance varied between the States and the comparison group. It is beyond the scope of the present report to perform a thorough analysis of the reasons for these differences, but we will note prominent differences and offer some possible explanations.

Rates for tonsillectomies varied between the States and the comparison group. The rate for "tonsillectomy without adenoidectomy" was similar in Tennessee to the comparison group, but this procedure did not appear on the high volume list in Georgia or Michigan. The rate for "tonsillectomy with adenoidectomy" in Georgia is similar to the rate in the comparison group. The rate for this procedure was much lower in Michigan, however, and somewhat higher in Tennessee. Note that the outpatient rate of performance of this procedure is much higher in Michigan than in the other States (see Section 3.2), so the lower inpatient rate in this State may simply reflect a greater tendency to use an outpatient setting for the procedure.

Adjusted rates for procedures on the digestive system are generally lower in the Medicaid populations than in the comparison group. Rates for "colonoscopy and other endoscopies" are somewhat lower than the comparison group in two of the States. The adjusted rate for "appendectomy, excluding incidental" was much lower in Michigan and Tennessee than in the

Table 3.4a
Adjusted Rates of Performance for High Volume Inpatient Procedures,
Tape-to-Tape States and Comparison Group, 1984

Procedure	Georgia	Michigan	Tennessee 1/	Comaparison Group 2/
Tonsillectomy without adenoidectomy	-	-	74	67 (5.0)
Tonsillectomy with adenoidectomy	82	36	120	94 (6.6)
Colonoscopy and other endoscopies	124	140	164	168 (10.1)
Appendectomy, excluding incidental	-	87	80	128 (8.3)
Cholecystectomy	129	184	153	156 (9.4)
Repair of inguinal hernia	124	-	120	150 (9.0)
Other bilateral destruction or occlusion of fallopian tubes	97	74	223	100 (7.0)
Abdominal hysterectomy	129	115	135	198 (11.9)
Dilation and curretage of uterus after delivery or abortion	74	127	-	113 (7.9)
Diagnostic dilation and curettage of uterus	66	-	-	168 (10.1)
Procedures to assist delivery	1,780	795	2,589	1,065 (47.9)
Caesarean Section	146	487	560	389 (21.4)
Intraaaniotic injection for abortion	-	58	-	5 (0.7)

1/ Comparisons with Tennessee should be made with caution. Inpatient procedures are coded using the ICD-9-CM coding system in Georgia, Michigan, and the comparison group. Inpatient procedures are coded using the CPT-4 system in Tennessee. The makeup of procedure categories may differ somewhat due to differences in the coding systems.

2/ Rates for the comparison group are sample estimates from the National Hospital Discharge Survey. Values in parentheses are approximate standard errors of the estimates.

comparison group and did not appear on the high volume list in Georgia. The rate for cholecystectomy in Tennessee was similar to the rate in the comparison group, but the rate was lower in Georgia and higher in Michigan. It is not clear why these differences occurred. Adjusted rates for "repair of inguinal hernia" are similar in Georgia and Tennessee and are lower than in the comparison group. This procedure did not appear on the high volume inpatient list in Michigan, but the rate of performance of this procedure on an outpatient basis is much higher in Michigan than in the other States.

Gynecological procedures also showed variation. The adjusted rate of performance for the category "other bilateral destruction or occlusion of fallopian tubes" is 97 per 100,000 enrollees in Georgia, 74 in Michigan, 223 in Tennessee, and 100 in the comparison group. The higher rate in Tennessee may be due in large part to the fact that the other groups are more likely to code this procedure as a secondary procedure in multiple-procedure episodes of care. Recall that the rates noted above reflect the number of times the procedure was coded as the primary procedure. If we look at the number of times the procedure was coded as a primary or secondary procedure we obtain adjusted rates of 219 in Georgia, 125 in Michigan, 243 in Tennessee, and 184 in the comparison group. The gap between Tennessee and the other groups is thus substantially reduced when primary and secondary procedures are considered. It is not clear why the other groups are more likely than Tennessee to include this procedure as a secondary procedure. It could reflect differences in medical practice (i.e., this procedure is performed less often in conjunction with other procedures in Tennessee) or it could simply reflect differences in styles of coding procedures on Medicaid claims (we found that Tennessee is

less likely than the other States to use the secondary procedure code on their Medicaid claims).

Note that the adjusted rate for this procedure is still lower in Michigan even after including primary and secondary procedures. In Michigan the rate for "bilateral endoscopic destruction or occlusion of fallopian tubes" performed on an outpatient basis is much higher than in the other States (see Section 3.2). It could be that such outpatient procedures are emphasized more in Michigan. We do not have outpatient data for the NHDS to see if this explanation may account for the somewhat lower rate in the comparison group that remained after including primary and secondary procedures in the inpatient category "other bilateral destruction or occlusion of fallopian tubes."

Adjusted rates of performance for abdominal hysterectomy are similar across the three States — 129 in Georgia, 115 in Michigan, and 135 in Tennessee — and are lower than for the comparison group (rate in the comparison group is 198). It is not clear why the rates are lower in these Medicaid populations.

The adjusted rate for "dilation and curettage of the uterus after delivery or abortion" is lower in Georgia than in the comparison group, higher in Michigan, and did not appear on the high volume list in Tennessee. The adjusted rate for "diagnostic dilation and curettage of uterus" was lower in Georgia than in the comparison group and did not appear on the high volume lists in Michigan and Tennessee.

Finally, we turn to obstetric procedures. The adjusted rate for "procedures to assist delivery" is higher in Georgia than in the comparison group, lower in Michigan, and much higher in Tennessee. The reason for these differences is not clear. Such procedures are not likely

candidates for a mandatory second surgical opinion program. The adjusted rate for Caesarean section is higher in Michigan and Tennessee than in the comparison group, and is lower in Georgia. Note, however, that our count of Caesarean sections in Georgia may be too low. Upon reviewing a draft of this report, the Georgia Medicaid agency notified us that it had a substantially higher count of the number of Caesarean sections performed than we showed (1,748 versus 728). Our count is based on the number of claims for inpatient stays for this procedure and their count was based on the number of physician claims for the procedure. It is not clear why the counts are so different from the two data sources, but we point out the possibility that our count may be too low. The rate for "intraamniotic injection for abortion" is higher in Michigan than in the comparison group. As noted previously, under current Federal regulations, Federal funds can be used for abortions only if the woman's life is in danger, but the States at their own option can cover abortions in less restrictive circumstances. Note that the fact that the rate for this procedure is higher in Michigan than for the comparison group does not necessarily indicate that the rate for abortions overall is higher in Michigan, since abortions may be performed by other means on an outpatient basis.

As noted previously, it is beyond the scope of this report to present a detailed analysis of utilization differences. We have simply tried to note prominent differences and offer some possible explanations. We caution the reader again that these differences should not necessarily be interpreted as reflecting over- or under-utilization of services in the Medicaid population. Our adjusted rates of performance only control for age and sex differences between the groups. There are many other potential differences between the groups that could account for the

differences in utilization observed. In addition, note that large differences in utilization of surgical as well as medical procedures have also been widely noted in non-Medicaid populations (see for example, Chassin et al., 1986). Section 9432(c) of OBRA-86 mandated a companion study to this report that will further analyze the utilization of surgical procedures in the Medicaid population, particularly focusing on issues of the appropriateness, necessity, and effectiveness of such procedures.

3.1.2 High Average Payment Procedures

In this section we present the information requested by the mandate for high average payment inpatient procedures. Table 3.5 presents the information requested by the mandate for high average payment inpatient procedures in Georgia. Several points are especially worth noting:

- Procedures on the cardiovascular system are prominent on the list of high average payment procedures in this State (other open heart operations, operations on the valves of the heart, direct heart revascularization, cardiac catheterization). Also included are: procedures on the respiratory system (lung lobectomy and pneumenectomy, temporary tracheostomy); procedures on the nervous system (extracranial ventricular shunt, laminectomy); procedures on the eyes (operations on the vitreous); and procedures on the musculoskeletal system (spinal fusion).
- The average payment for these procedures ranged from 3.65 times the average cost for all procedures (other open heart operations) to 1.82 times the overall average (cardiac catheterization).

Table 3.5
High Average Payment Inpatient Procedures in the Medicaid Population,
Georgia, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Other open heart operations	8,925	3.65	303.4	0.5	34	8	10	22	11
2	Operations on the valves of the heart	8,039	3.29	112.5	0.2	14	3	5	10	14
3	Direct heart revascularization	7,277	2.97	196.5	0.3	27	6	16	55	25
4	Lung lobectomy and pneumenectomy	5,079	2.08	50.8	0.1	10	2	5	9	16
5	Temporary tracheostomy	4,949	2.02	94.0	0.2	19	5	6	8	10
6	Operations on vitreous	4,947	2.02	178.1	0.3	36	8	13	8	13
7	Spinal fusion	4,862	1.99	286.9	0.5	59	14	20	17	39
8	Extracranial ventricular shunt	4,488	1.83	529.6	0.8	118	27	19	10	34
9	Laminectomy	4,478	1.83	170.2	0.3	38	9	15	32	32
10	Cardiac catheterization	4,463	1.82	937.1	1.5	210	48	80	136	14
	All procedures	2,447	1.00	62,721.2	100.0	25,631	5,873	5,780	7,195	2,593

Table 3.6 presents information on high average payment inpatient procedures in Michigan.

- Procedures on the cardiovascular system again are prominent on the list of high average payment procedures (operations on the valves of the heart, direct heart revascularization, other open heart operations). Also included are: procedures on the digestive system (vagotomy; ileostomy, colostomy, and other enterostomy; partial gastrectomy); procedures on the respiratory system (temporary tracheostomy, lung lobectomy and pneumenectomy); procedures on the nervous system (incision and excision of the skull, brain, and cerebral meninges); and procedures on the musculoskeletal system (spinal fusion).
- The average payment for these procedures ranged from 9.29 times the average payment for all procedures (temporary tracheostomy) to 2.96 times the overall average (spinal fusion).
- The overall average payment for procedures in this State is higher than the average payment for procedures in the other States (average payment for all procedures is $3,544 in Michigan, $2,447 in Georgia, and $2,149 in Tennessee).

Table 3.7 presents information on high average payment inpatient procedures in Tennessee. Several points should be noted:

- Procedures on the cardiovascular system again are prominent on the list of high average payment procedures (operations on the valves of the heart, direct heart revascularization, other open heart operations, systematic shunt and graft bypass). Also included are: procedures on the nervous system (incision and excision of the skull, brain, and cerebral menenges; extracranial ventricular

Table 3.6
High Average Payment Inpatient Procedures in the Medicaid Population, Michigan, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Temporary tracheostomy	32,930	9.29	2,075.4	1.3	63	6	9	8	99
2	Operations on the valves of of the heart	17,443	4.92	994.0	0.6	57	5	10	10	53
3	Vagotomy	17,428	4.92	349.0	0.2	20	2	4	5	27
4	Direct heart revascularization	15,833	4.47	2,232.1	1.3	141	13	44	55	125
5	Ileostomy, colostomy, and other enterostomy	13,244	3.74	728.0	0.4	55	5	9	6	59
6	Incision and excision of the skull, brain, and cerebral meninges	12,132	3.42	2,802.9	1.7	231	22	28	20	157
7	Lung lobectomy and pneumenectomy	12,120	3.42	642.0	0.4	53	5	15	9	55
8	Partial gastrectomy	11,562	3.26	636.0	0.4	55	5	11	6	54
9	Other open heart operations	11,177	3.15	1,174.3	0.7	105	10	14	22	46
10	Spinal fusion	10,496	2.96	787.2	0.5	75	7	11	17	65
	All procedures	3,544	1.00	165,585.4	100.0	46,718	4,457	4,538	7,195	6,597

Table 3.7
High Average Payment Inpatient Procedures in the Medicaid Population, Tennessee, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Operations on the valves of the heart	9,861	4.59	157.8	0.3	16	5	7	10	19
2	Temporary tracheostomy	9,397	4.37	159.7	0.3	17	5	7	6	16
3	Direct heart revascularization	7,845	3.65	274.6	0.5	35	11	22	55	25
4	Other open heart operations	7,638	3.55	336.1	0.7	44	14	17	22	31
5	Incision and excision of the skull, brain, and cerbral meninges	7,420	3.45	541.6	1.1	73	23	26	20	45
6	Spinal fusion	7,065	3.29	120.1	0.2	17	5	4	17	12
7	Resection of intestine	5,707	2.66	251.1	0.5	44	14	20	32	52
8	Arthroplasty and replacement of hip	5,683	2.64	181.9	0.4	32	10	15	19	23
9	Extracranial ventricular shunt	5,174	2.41	424.3	0.8	82	25	11	10	29
10	Systematic shunt and graft bypass	5,033	2.34	337.2	0.7	67	21	30	23	37
	All procedures	2,149	1.00	50,562.4	100.0	23,527	7,283	7,137	7,195	1,932

shunt); procedures on the musculoskeletal system (spinal fusion, arthroplasty and replacement of hip); procedures on the respiratory system (temporary tracheostomy); procedures on the digestive system (resection of intestine).

- The average payment for these procedures ranged from 4.59 times the average payment for all procedures (operations on the valves of the heart) to 2.34 times the overall average (systematic shunt and graft bypass).

Table 3.8 summarizes the overlap of high average payment procedures in our sample States. Both consistency and variation are evident:

- A total of 17 unique procedures appeared in the lists of high average payment procedures in the three States.
- Five of the 17 procedures appeared in all three States (temporary tracheostomy; operations on the valves of the heart; direct heart revascularization; other open heart operations; spinal fusion).
- Three other procedures appeared on the lists of two of the three States (incision and excision of the skull, brain and cerebral meninges; extracranial ventricular shunt; lung lobectomy and pneumenectomy).

Note, however, that variation between the States is also substantial:

- Nine procedures appeared on the list of top ten procedures in only one State (laminectomy; operations on vitreous; cardiac catheterization; systematic shunt and graft bypass; partial gastrectomy; vagotomy; resection of intestine; ileostomy, colostomy and other enterostomy; arthroplasty and replacement of hip).
- Actual average payments varied widely between the States. Average

Table 3.8
Overlap of High Average Payment Inpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Rank		
	Georgia	Michigan	Tennessee
Incision and excision of the skull, brain, and cerebral meninges	-	6	5
Extracranial ventricular shunt	8	-	9
Laminectomy	9	-	-
Operations on vitreous	6	-	-
Temporary tracheostomy	5	1	2
Lung lobectomy and pneumenectomy	4	7	-
Operations on the valves of the heart	2	2	1
Direct heart revascularization	3	4	3
Other open heart operations	1	9	4
Cardiac catheterization	10	-	-
Systematic shunt and graft bypass	-	-	10
Partial gastrectomy	-	8	-
Vagotomy	-	3	-
Resection of intestine	-	-	7
Ileostomy, colostomy and other enterostomy	-	5	-
Spinal fusion	7	10	6
Arthroplasty and replacement of hip	-	-	8

payments in Michigan were higher than in the other two States.

It is beyond the scope of this report to perform a detailed analysis of possible reasons for this difference in actual average payments, but a number of factors can be identified that could contribute to the difference. Program characteristics of these States may be factors. For example, the Tennessee Medicaid program covered a maximum of only 14 inpatient days per year and had limits on preoperative days and weekend admissions. Georgia did not have a medically needy program in 1984, so patients who were not categorically eligible but had very high medical expenses did not qualify for Medicaid coverage in this State. The Michigan program contained a limitation that inpatient procedures that could be performed on an outpatient basis were not covered. Thus inpatient stays in this State may entail medical conditions that were more involved and thus more costly. The relative supply of hospital beds and physicians was also lower in Michigan than in the other States. There were 33 hospital beds per 1,000 Medicaid recipients in Michigan, 58 in Georgia, and 82 in Tennessee. There were 12 enrolled physicians per 1,000 Medicaid recipients in Michigan, 32 in Georgia, and 12 in Tennessee. In addition, the average length of an inpatient stay was longer in Michigan than in the other States (average of 7.5 days in Michigan, 4.2 days in Georgia, and 4.4 days in Tennessee), and the average payment per inpatient day was also higher in Michigan (average payment of $389 per day in Michigan, $298 per day in Georgia, and $285 per day in Tennessee).

3.1.3 High Aggregate Payment Procedures

In this section we present the information requested by the mandate for high aggregate payment inpatient procedures for our sample States. Table 3.9 presents information for high aggregate payment procedures in Georgia. Note the following points from this table:

- A procedure can be high in aggregate payment because it is high in volume, or because it is high in average payment, or because it is moderate to high in both. In this State, the high aggregate payment procedures were procedures that were high in volume. Eight of the ten high aggregate payment procedures also appeared on the high volume list (procedures to assist delivery, Caesarean section, tonsillectomy with adenoidectomy, abdominal hysterectomy, cholecystectomy, other bilateral destruction or occlusion of fallopian tubes, colonoscopy and other endoscopies, repair of inguinal hernia). Only one high aggregate payment procedure also appeared on the high average payment list (cardiac catheterization). One high aggregate payment procedure did not appear on either of the other two lists (operations on muscles, tendons, fascia, and bursa).
- By far, the category with the highest aggregate payment was procedures to assist delivery.
- These ten procedures account for 46.5 percent of the aggregate payments for all procedures for noncrossovers in the State.

Table 3.10 presents information on high aggregate payment inpatient procedures in Michigan.

Table 3.9
High Aggregate Payment Inpatient Procedures in the Medicaid Population,
Georgia, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Procedures to assist delivery	2,197	.90	19,417.1	31.0	8,839	2,025	1,780	1,065	414
2	Caesarean section	2,269	.93	1,651.5	2.6	728	167	146	389	238
3	Tonsillectomy with adenoidectomy	2,001	.82	1,322.8	2.1	661	151	82	94	86
4	Abdominal hysterectomy	2,297	.94	1,281.8	2.0	558	128	129	198	109
5	Cholecystectomy	2,605	1.06	1,172.1	1.9	450	103	129	156	243
6	Other bilateral destruction or occlusion of fallopian tubes	2,044	.84	981.1	1.6	480	110	97	100	147
7	Cardiac catheterization	4,463	1.82	937.1	1.5	210	48	80	136	14
8	Colonoscopy and other endoscopies	2,466	1.01	912.4	1.5	370	85	124	168	141
9	Repair of inguinal hernia	2,181	.89	809.1	1.3	371	85	124	150	165
10	Operations on muscles, tendons, fascia and bursa	2,684	1.10	740.7	1.2	276	63	85	78	130
	All procedures	2,447	1.00	62,721.2	100.0	25,631	5,873	5,780	7,195	2,593

Table 3.10
High Aggregate Payment Inpatient Procedures in the Medicaid Population,
Michigan, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Caesarean section	3,655	1.03	21,141.6	12.8	5,785	552	487	389	1,087
2	Procedures to assist delivery	1,984	.56	18,985.1	11.5	9,570	913	795	1,065	1,023
3	Cholecystectomy	3,691	1.04	5,101.0	3.1	1,382	132	184	156	522
4	Colonoscopy and other endoscopies	4,044	1.14	3,761.9	2.3	930	89	140	168	353
5	Abdominal hysterectomy	3,425	.97	3,702.3	2.2	1,081	103	115	198	434
6	Incision and excision of the skull, brain, and cerebral meninges	12,132	3.42	2,802.9	1.7	231	22	28	20	157
7	Laparotomy	6,270	1.77	2,596.9	1.6	414	40	51	21	305
8	Open reduction of fracture	4,086	1.15	2,538.7	1.5	621	59	79	106	330
9	Appendectomy, excluding incidental	2,585	.73	2,441.0	1.5	944	90	87	128	485
10	Systematic shunt and graft bypass	9,687	2.73	2,305.0	1.4	238	23	47	23	205
	All procedures	3,544	1.00	165,585.4	100.0	46,718	4,457	4,538	7,195	6,597

- The high aggregate payment procedures in this State also tend to be procedures that were high in volume. Six of the ten high aggregate payment procedures also appeared on the high volume list (Caesarean section, procedures to assist delivery, cholecystectomy, colonoscopy and other endoscopies, abdominal hysterectomy, appendectomy). One of the high aggregate payment procedures appeared on the high average payment list (incision and excision of the skull, brain, and cerebral meninges). Three procedures on the high aggregate payment list did not appear on either of the other lists (laparotomy, open reduction of fracture, systematic shunt and graft bypass).
- These ten procedures account for 39.5 percent of the aggregate payments for all procedures for noncrossovers in the State. Two procedures account for 24.3 percent of all payments (Caesarean section, procedures to assist delivery).

Table 3.11 presents information on high aggregate payment inpatient procedures in Tennessee. Several points should be noted:

- As in the other States, the high aggregate payment procedures tend to be procedures that were high in volume. Seven of the ten high aggregate payment procedures also appeared on the high volume list (procedures to assist delivery, Caesarean section, abdominal hysterectomy, cholecystectomy, other bilateral destruction or occlusion of fallopian tubes, colonoscopy and other endoscopies, tonsillectomy with adenoidectomy). None of the high aggregate payment procedures appeared on the high average payment list. The remaining three procedures on the aggregate payment list did not appear on either of the other two lists (open reduction of

Table 3.11
High Aggregate Payment Inpatient Procedures in the Medicaid Population, Tennessee, 1984

		Payment Rate		Aggregate Payments		Rate of Performance				Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Adjusted Rate per 100,000 Enrolled	Rate per 100,000, comparison group	Number
1	Procedures to assist delivery	1,420	.66	13,300.8	26.3	9,365	2,899	2,589	1,065	430
2	Caesarean section	2,943	1.37	5,974.3	11.8	2,030	628	560	389	309
3	Abdominal hysterectomy	3,593	1.67	1,591.6	3.1	443	137	135	198	176
4	Cholecystectomy	3,742	1.74	1,549.3	3.1	414	128	153	156	226
5	Other bilateral destruction or occlusion of fallopian tubes	1,839	.86	1,497.3	3.0	814	252	223	100	218
6	Open reduction of fracture	3,228	1.50	813.5	1.6	252	78	111	106	121
7	Colonoscopy and other endoscopies	1,992	.93	792.8	1.6	398	123	164	168	150
8	Laparotomy	3,785	1.76	647.3	1.3	171	53	63	21	109
9	Tonsillectomy with adenoidectomy	952	.44	630.1	1.2	662	205	120	94	149
10	Unilateral oophorectomy and salpingo-oophorectomy	3,100	1.44	573.6	1.1	185	57	53	31	102
	All procedures	2,149	1.00	50,562.4	100.0	23,527	7,283	7,137	7,195	1,932

fracture, laparotomy, unilateral oophorectomy and salpingo-oophorectomy).

- As was the case in Georgia, the category with the highest aggregate payment by far was procedures to assist delivery.
- These ten procedures account for 54.1 percent of the aggregate payments for all procedures for noncrossovers in the State. Two procedures account for 38.1 percent of all payments (procedures to assist delivery, Caesarean section).

Table 3.12 summarizes the overlap of high aggregate payment procedures in our sample States. Although not to the extent found in the high volume procedures, there is still a considerable overlap between the States in procedures that were high in aggregate payment:

- A total of only 16 unique procedures appeared on the lists of high aggregate payment procedures.
- Five of these procedures were present in all three States (colonoscopy and other endoscopies, cholecystectomy, abdominal hysterectomy, procedures to assist delivery, Caesarean section).
- Four of the procedures were present in two of the three States (tonsillectomy with adeniodectomy, laparotomy, other bilateral destruction or occlusion of fallopian tubes, open reduction of fracture).

Variation between the States is also evident:

- Seven procedures appeared on the list of top ten procedures in only one State (incision and excision of the skull, brain, and cerebral meninges; cardiac catheterization; systematic shunt and graft bypass; appendectomy; repair of inguinal hernia; unilateral oophorectomy and salpingo-oophorectomy; operations on muscles,

Table 3.12
Overlap of High Aggregate Payment Inpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Rank		
	Georgia	Michigan	Tennessee
Incision and excision of the skull, brain, and cerebral meninges	-	6	-
Tonsillectomy with adenoidectomy	3	-	9
Cardiac catheterization	7	-	-
Systematic shunt and graft bypass	-	10	-
Colonoscopy and other endoscopies	8	4	7
Appendectomy, excluding incidental	-	9	-
Cholecystectomy	5	3	4
Repair of inguinal hernia	9	-	-
Laparotomy	-	7	8
Unilateral oophorectomy and salpingo-oophorectomy	-	-	10
Other bilateral destruction or occlusion of fallopian tubes	6	-	5
Abdominal hysterectomy	4	5	3
Procedures to assist delivery	1	2	1
Caesarean section	2	1	2
Open reduction of fracture	-	8	6
Operations on muscles, tendons, fascia and bursa	10	-	-

tendons, fascia and bursa).

In summary, several points stand out from our analysis of high volume and high payment inpatient procedures. We found substantial overlap between our sample States in the procedures that were high in volume, and obstetric procedures were prominent on the lists. In addition, the top ten procedures in terms of volume accounted for a large share of the overall volume in the States. Though there was substantial overlap in the procedures that appeared on the high volume lists, variation in actual rates of performance among the sample States and the comparison group was also evident.

Major operations of the cardiovascular system were prominent in the list of procedures that were high in average payment. There was quite a bit of variation in actual average payments, with the payments in Michigan higher than in the other two States.

Though not as great as with the high volume list, there was still considerable overlap between the States in procedures that were high in aggregate payment. Procedures that were high in aggregate payment tended to be procedures that were also high in volume. Finally, the top ten procedures in terms of aggregate payment accounted for a large share of the total payments for procedures in our sample States.

3.2 Outpatient Procedures

We turn now to presenting the information requested by the congressional mandate for outpatient procedures. Note that the NHDS does not have data on outpatient procedures. Therefore we are not able to include a comparison of adjusted rates of performance in the Medicaid population to rates of performance in the comparison group.

3.2.1 High Volume Procedures

In this section we present results for high volume outpatient procedures in our sample States. We will only present a brief overview of the results for the three States because the high volume outpatient procedures tend to be very low in average payments; many of of these procedures are probably associated with minor accidents and the like. Most of these procedures would not be likely candidates for a mandatory second opinion program.

Tables 3.13 through 3.15 present information on the high volume procedures in Georgia, Michigan, and Tennessee respectively. Table 3.16 presents the overlap of high volume procedures in the three States. Note the following summary points:

- o There is a sizeable overlap in the outpatient procedures that were high in volume. A total of only 15 unique procedures appeared on the high volume lists in the three States. Seven of the 15 appeared in all three States.
- o Procedures on the musculoskeletal and integumentary systems, many of which were probably the result of minor accidents, are prominent

Table 3.13
High Volume Outpatient Procedures in the Medicaid Population,
Georgia, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Other excision or destruction of lesion of skin and subcutaneous tissue	56	.36	262	5.6	4,710	1,079	914
2	Incision of skin and subcutaneous tissue	40	.26	151	3.3	3,767	863	758
3	Operations on muscles, tendons, fascia and bursa	74	.48	148	3.2	2,018	462	494
4	Suture of skin and subcutaneous tissue	71	.46	121	2.6	1,707	391	490
5	Debridement of wound, infection or burn	39	.25	54	1.2	1,388	318	302
6	Biopsy and other diagnostic procedures on female genital organs	76	.50	100	2.2	1,315	301	224
7	Other reduction of fracture	166	1.08	180	3.9	1,085	249	336
8	Other intrauterine operation on fetus and amnion	47	.31	50	1.1	1,061	243	54
9	Colonoscopy and other endoscopies	275	1.79	221	4.8	806	185	227
10	Biopsies and other endoscopies of the digestive system	216	1.41	171	3.7	792	181	275
	All procedures	153	1.00	4,639	100.0	30,029	6,881	2,674

Table 3.14
High Volume Outpatient Procedures in the Medicaid Population,
Michigan, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physicians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Other excision or destruction of lesion of skin and subcutaneous tissue	47	.42	2,870	9.7	61,008	5,821	4,031
2	Incision of skin and subcutaneous tissue	32	.29	1,192	4.0	37,519	3,580	3,089
3	Operations on muscles, tendons, fascia, and bursa	44	.40	901	3.0	20,271	1,934	1,895
4	Dilation and curettage of uterus to terminate pregnancy	310	2.79	4,898	16.5	15,784	1,506	265
5	Debridement of wound, infection or burn	27	.24	338	1.1	12,564	1,199	1,942
6	Other reduction of fracture	108	.97	995	3.4	9,210	879	1,906
7	Suture of skin and subcutaneous tissue	101	.91	799	2.7	7,871	751	1,591
8	Biopsy and other diagnostic procedures on female genital organs	100	.90	772	2.6	7,718	736	818
9	Other intrauterine operation on fetus and amnion	20	.18	113	0.4	5,605	535	249
10	Other excision or destruction of cervix, uterus, and supporting structures	48	.43	261	0.9	5,399	515	763
	All procedures	111	1.00	29,619	100.0	267,645	25,536	8,270

Table 3.15
High Volume Outpatient Procedures in the Medicaid Population,
Tennessee, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Other excision or destruction of lesion of skin and subcutaneous tissue	41	.28	116	3.9	2,797	866	681
2	Operations on muscles, tendons, fascia, and bursa	59	.40	126	4.2	2,124	658	394
3	Suture of skin and subcutaneous tissue	86	.59	161	5.4	1,865	577	463
4	Incision of skin and subcutaneous tissue	39	.27	56	1.9	1,444	447	555
5	Other reduction of fracture	188	1.28	161	5.4	858	266	267
6	Debridement of wound, infection or burn	38	.26	27	0.9	699	216	213
7	Biopsy and other diagnostic procedures on female genital organs	82	.56	57	1.9	698	216	134
8	Puncture of vessel	44	.30	31	1.0	694	215	93
9	Dilation of urethra	30	.20	19	0.6	616	191	104
10	Myringotomy	480	3.27	272	9.1	568	176	124
	All procedures	147	1.00	2,990	100.0	20,201	6,254	2,046

Table 3.16
Overlap of High Volume Outpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Rank		
	Georgia	Michigan	Tennessee
Puncture of vessel	-	-	8
Myringotomy	-	-	10
Colonoscopy and other endoscopies	9	-	-
Biopsies and other endoscopies of the digestive system	10	-	-
Dilation of urethra	-	-	9
Other excision or destruction of cervix, uterus, and supporting structures	-	10	-
Dilation and curettage of uterus to terminate pregnancy	-	4	-
Biopsy and other diagnostic procedures on female genital organs	6	8	7
Other intrauterine operation on fetus and amnion	8	9	-
Other reduction of fracture	7	6	5
Operations on muscles, tendons, fascia, and bursa	3	3	2
Incision of skin and subcutaneous tissue	2	2	4
Debridement of wound, infection or burn	5	5	6
Other excision or destruction of lesion of skin and subcutaneous tissue	1	1	1
Suture of skin and subcutaneous tissue	4	7	3

on the lists of high volume procedures (other reduction of fracture; operations on muscles, tendons, fascia, and bursa; incision of skin and subcutaneous tissue; debridement of wound, infection or burn; other excision or destruction of lesion of skin and subcutaneous tissue; suture of skin and subcutaneous tissue). Also included on the lists are gynecological procedures (other excision or destruction of cervix, uterus, and supporting structures; dilation and curettage of uterus to terminate pregnancy; and biopsy and other diagnostic procedures on female genital organs), diagnostic procedures on the digestive system (colonoscopy and other endoscopies, biopsies and other endoscopies of the digestive system), and other miscellaneous procedures (puncture of vessel, myringotomy, dilation of urethra, other intrauterine operation on fetus and amnion).

- The high volume procedures are not expensive on the average. Most of the procedures had average payments under $100 in 1984. Notable exceptions, however, are: myringotomy, dilation and curettage of uterus to terminate pregnancy, and diagnostic procedures on the digestive system.
- The top ten procedures account for a large share of the total volume in the States (62 percent in Georgia, 68 percent in Michigan, 61 percent in Tennessee).

Note that the category "dilation and curettage of uterus to terminate pregnancy" appeared on the high volume list in Michigan. As noted previously, under current Federal regulations, Federal funds can be used for abortions only if the woman's life is in danger. However, the States at their own option can cover abortions in less restrictive circumstances.

Although the same procedures tend to appear on the high volume lists in these States, there is substantial variation in actual rates of performance. We computed rates of performance that are adjusted for age and sex differences between the States. (We could not adjust the rates based on the national comparison group as was done for inpatient procedures because the NHDS does not include procedures performed on an outpatient basis. We therefore standardized to the three-State total.) Table 3.16a presents the adjusted rates of performance for the sample States. The most obvious point in this table is that the adjusted rates are much higher in Michigan than in the other States. It is not clear why this is the case.

3.2.2 High Average Payment Procedures

In this section we present the information requested by the mandate for high average payment outpatient procedures. Table 3.17 presents the results for Georgia. Note the following points from this table:

- Prominent on the list are procedures on the eyes (extraction of lens and insertion of prosthesis, resection and recession of ocular muscle) and procedures on the digestive system (division of peritoneal adhesions, laparoscopy, repair of inguinal hernia, repair of umbilical hernia). Also included are gynecological procedures (other bilateral destruction or occlusion of fallopian tubes, bilateral endoscopic destruction or occlusion of fallopian tubes), and procedures on the respiratory system (excision or destruction of lesion or tissue of larynx, biopsy and other diagnostic procedures on the respiratory system).

Table 3.16a
Adjusted Rates of Performance for High Volume Outpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Georgia	Michigan	Tennessee
Puncture of vessel	-	-	196
Myringotomy	-	-	178
Colonoscopy and other endoscopies	173	-	-
Biopsies and other endoscopies of the digestive system	171	-	-
Dilation of urethra	-	-	161
Other excision or destruction of cervix, uterus, and supporting structures	-	518	-
Dilation and curettage of uterus to terminate pregnancy	-	1,503	-
Biopsy and other diagnostic procedures on female genital organs	296	747	212
Other intrauterine operation on fetus and amnion	243	433	-
Other reduction of fracture	252	867	268
Operations on muscles, tendons, fascia, and bursa	426	2,054	568
Incision of skin and subcutaneous tissue	859	3,620	444
Debridement of wound, infection or burn	302	1,235	209
Other excision or destruction of lesion of skin and subcutaneous tissue	1,015	5,984	830
Suture of skin and subcutaneous tissue	396	734	593

Table 3.17
High Average Payment Outpatient Procedures in the Medicaid Population, Georgia, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Extraction of lens and insertion of prosthesis	1,409	9.20	147	3.2	104	24	47
2	Division of peritoneal adhesions	988	6.45	29	0.6	29	7	9
3	Resection and recession of ocular muscle	914	5.97	34	0.7	37	8	21
4	Laparoscopy	842	5.50	205	4.4	244	56	62
5	Repair of inguinal hernia	813	5.31	55	1.2	68	16	36
6	Repair of umbilical hernia	787	5.14	42	0.9	53	12	35
7	Other bilateral destruction or occlusion of fallopian tubes	692	4.52	80	1.7	115	26	44
8	Excision or destruction of lesion or tissue of larynx	685	4.47	12	0.3	17	4	11
9	Bilateral endoscopic destruction or occlusion of fallopian tubes	671	4.38	150	3.2	224	51	85
10	Biopsy and other diagnostic procedures on the respiratory system	615	4.01	14	0.3	22	5	15
	All procedures	153	1.00	4,639	100.0	30,029	6,881	2,674

- Average payments ranged from 9.20 times the average for all procedures (for extraction of lens and insertion of prosthesis) to 4.01 times the overall average (for biopsy and other diagnostic procedures on the respiratory system).

Results for high average payment outpatient procedures for Michigan are presented in Table 3.18.

- Procedures on the eyes are prominent on the list (extraction of lens and insertion of prosthesis, resection and recession of ocular muscle). Also included are procedures on the digestive system (repair of inguinal hernia, repair of umbilical hernia), procedures on the musculoskeletal system (excision of semilunar cartilege of knee), procedures on the male genital organs (orchiectomy and orchiopexy), procedures on the respiratory system (excision or destruction of lesion or tissue of larynx), procedures on the nose (rhinoplasty and repair of nose), procedures on the ears (tympanoplasty), and gynecological procedures (bilateral endoscopic destruction or occlusion of fallopian tubes).
- By far, the procedure with the highest average payment in this State was extraction of lens and insertion of prosthesis.
- The large difference in the average payment for procedures between Michigan and the other States on the inpatient side is not apparent on the outpatient side.

Table 3.19 presents the information requested for Tennessee's high average payment outpatient procedures. Note the following:

- High average payment procedures include gynecological procedures (bilateral endoscopic destruction or occlusion of fallopian tubes, other bilateral destruction or occlusion of fallopian tubes,

Table 3.18
High Average Payment Outpatient Procedures in the Medicaid Population, Michigan, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Extraction of lens and insertion of prosthesis	1,435	12.89	228	0.8	159	15	80
2	Resection and recession of ocular muscle	862	7.74	231	0.8	268	26	99
3	Excision of semilunar cartilage of knee	842	7.56	159	0.5	189	18	106
4	Orchiectomy and orchiopexy	811	7.28	92	0.3	113	11	62
5	Repair of inguinal hernia	785	7.05	566	1.9	721	69	248
6	Excision or destruction of lesion or tissue of larynx	747	6.71	54	0.2	72	7	39
7	Repair of umbilical hernia	747	6.70	117	0.4	157	15	84
8	Rhinoplasty and repair of nose	735	6.60	147	0.5	200	19	69
9	Tympanoplasty	717	6.44	67	0.2	93	9	48
10	Bilateral endoscopic destruction or occlusion of fallopian tubes	645	5.79	1,261	4.3	1,955	187	368
	All procedures	111	1.00	29,619	100.0	267,645	25,536	8,270

Table 3.19
High Average Payment Outpatient Procedures in the Medicaid Population,
Tennessee, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Extraction of lens and insertion of prosthesis	1,840	12.53	40	1.4	22	7	15
2	Tympanoplasty	1,421	9.67	31	1.0	22	7	19
3	Repair of umbilical hernia	1,295	8.82	27	0.9	21	7	9
4	Repair of inguinal hernia	1,066	7.26	54	1.8	51	16	27
5	Bilateral endoscopic destruction or occlusion of fallopian tubes	1,005	6.84	278	9.3	277	86	48
6	Resection and recession of ocular muscle	951	6.47	17	0.6	18	6	11
7	Sinusotomy	886	6.03	13	0.4	15	5	8
8	Other bilateral destruction or occlusion of fallopian tubes	884	6.02	48	1.6	54	17	21
9	Adenoidectomy without tonsillectomy	785	5.34	13	0.4	16	5	14
10	Diagnostic dilation and curettage of uterus	784	5.34	125	4.2	160	50	91
	All procedures	147	1.00	2,990	100.0	20,201	6,254	2,046

diagnostic dilation and curretage of the uterus), procedures on the eyes (extraction of lens and insertion of prosthesis, resection and recession of ocular muscle), procedures on the digestive system (repair of umbilical hernia, repair of inguinal hernia), procedures on the nose, mouth and pharynx (sinusotomy, adenoidectomy without tonsillectomy), and procedures on the ear (tympanoplasty).

- Average payments ranged from 12.53 times the overall average for all outpatient procedures (for extraction of lens and insertion of prosthesis) to 5.34 times the overall average (for diagnostic dilation and curretage).

Table 3.20 present the overlap between the sample States in the procedures that were high in average payment. Both consistency and variation are evident:

- A total of 17 unique procedures appeared on the high average payment lists.
- Five of these 17 appeared in all three States (extraction of lens and insertion of prosthesis, resection and recession of ocular muscle, repair of inguinal hernia, repair of umbilical hernia, bilateral endoscopic destruction or occlusion of fallopian tubes).
- Three addition procedures appeared in two of the three States (tympanoplasty, excision or destruction of lesion or tissue of larynx, other bilateral destruction or occlusion of fallopian tubes).
- Note, however, that nine of the 17 procedures appeared in only one State (rhinoplasty and repair of nose, adenoidectomy without tonsillectomy, biopsy and other diagnostic procedures on the

Table 3.20
Overlap of High Average Payment Outpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Rank		
	Georgia	Michigan	Tennessee
Extraction of lens and insertion of prosthesis	1	1	1
Resection and recession of ocular muscle	3	2	6
Tympanoplasty	-	9	2
Rhinoplasty and repair of nose	-	8	-
Adenoidectomy without tonsillectomy	-	-	9
Excision or destruction of lesion or tissue of larynx	8	6	-
Biopsy and other diagnostic procedures on the respiratory system	10	-	-
Repair of inguinal hernia	5	5	4
Repair of umbilical hernia	6	7	3
Laparoscopy	4	-	-
Division of peritoneal adhesions	2	-	-
Orchiectomy and orchiopexy	-	4	-
Bilateral endoscopic destruction or occlusion of fallopian tubes	9	10	5
Other bilateral destruction or occlusion of fallopian tubes	7	-	8
Diagnostic dilation and curettage of uterus	-	-	10
Excision of semilunar cartilage of knee	-	3	-
Sinuostomy	-	-	7

respiratory system, laparoscopy, division of peritoneal adhesions, orchiectomy and orchiopexy, diagnostic dilation and curettage of uterus, excision of semilunar cartilage of knee, sinuostomy).

3.2.3 High Aggregate Payment Procedures

In this section we present the results requested by the mandate for high aggregate payment outpatient procedures. We will see that the high aggregate payment procedures account for a large share of the total payments for outpatient procedures in the sample States and tend to overlap with the high volume procedures, though not to the extent seen on the inpatient side.

Table 3.21 presents the results for Georgia. The following points are especially worthy of note:

- Recall that a procedure can be high in aggregate payment because it is high in volume, or because it is high in average payment, or because it is moderate to high in both. The high aggregate payment procedures in this State tended to be procedures that were high in volume. Six procedures that appeared on this list also appeared on the high volume list (other excision or destruction of lesion of skin and subcutaneous tissue; incision of skin and subcutaneous tissue; operations on muscles, tendons, fascia and bursa; other reduction of fracture; colonoscopy and other endoscopies; biopsies and other endoscopies of the digestive system). Two procedures on this list also appeared on the high average payment list (laparoscopy, bilateral endoscopic destruction or occlusion of fallopian tubes). The remaining two procedures did not appear on

Table 3.21
High Aggregate Payment Outpatient Procedures in the Medicaid Population,
Georgia, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Diagnostic dilation and curettage of uterus	564	3.68	396	8.5	702	161	196
2	Myringotomy	551	3.60	308	6.6	558	128	79
3	Other excision or destruction of lesion of skin and subcutaneous tissue	56	.36	262	5.6	4,710	1,079	914
4	Colonoscopy and other endoscopies	275	1.79	221	4.8	806	185	227
5	Laparoscopy	842	5.50	205	4.4	244	56	62
6	Other reduction of fracture	166	1.08	180	3.9	1,085	249	336
7	Biopsies and other endoscopies of the digestive system	216	1.41	171	3.7	792	181	275
8	Incision of skin and subcutaneous tissue	40	.26	151	3.3	3,767	863	758
9	Bilateral endoscopic destruction or occlusion of fallopian tubes	671	4.38	150	3.2	224	51	85
10	Operations on muscles, tendons, fascia, and bursa	74	.48	149	3.2	2,018	462	494
	All procedures	153	1.00	4,639	100.0	30,029	6,881	2,674

either of the other lists in this State (diagnostic dilation and curretage of uterus, myringotomy).

- These ten high aggregate payment procedures account for 47 percent of the total payments for outpatient procedures in the State.
- Aggregate payments for inpatient procedures are over 13 times the aggregate payments for outpatient procedures in this State.

Results for high aggregate payment outpatient procedures in Michigan are presented in Table 3.22. Note the following:

- The high aggregate payment procedures in this State also tended to be procedures that were high in volume. Five of the procedures that appeared on this list also appeared on the high volume list (dilation and curettage of uterus to terminate pregnancy; other excision or destruction of lesion of skin and subcutaneous tissue; incision of skin and subcutaneous tissue; other reduction of fracture; operations on muscles, tendons, fascia, and bursa). Bilateral endoscopic destruction or occlusion of fallopian tubes appeared on this list and on the high average payment list. Four procedures did not appear on either the high volume or high average payment list (diagnostic dilation and curettage of uterus, myringotomy, tonsillectimy with adenoidectomy, and colonoscopy and other endoscopies).
- The ten high aggregate payment procedures account for 56 percent of the total payments for outpatient procedures.
- Aggregate payments for inpatient procedures are much larger than aggregate payments for outpatient procedures, but not to the extent found in the other States (inpatient payments were

Table 3.22
High Aggregate Payment Outpatient Procedures in the Medicaid Population, Michigan, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Dilation and curettage of uterus to terminate pregnancy	310	2.79	4,898	16.5	15,784	1,506	265
2	Other excision or destruction of lesion of skin and subcutaneous tissue	47	.42	2,870	9.7	61,008	5,821	4,031
3	Diagnostic dilation and curettage of uterus	475	4.26	1,801	6.1	3,795	362	935
4	Bilateral endoscopic destruction or occlusion of fallopian tubes	645	5.79	1,261	4.3	1,955	187	368
5	Incision of skin and subcutaneous tissue	32	.29	1,192	4.0	37,519	3,580	3,089
6	Other reduction of fracture	108	.97	995	3.4	9,210	879	1,906
7	Myringotomy	365	3.28	990	3.3	2,712	259	201
8	Tonsillectomy with adeniodectomy	565	5.07	962	3.2	1,703	162	267
9	Operations on muscles, tendons, fascia, and bursa	44	.40	901	3.0	20,271	1,934	1,875
10	Colonoscopy and other endoscopies	230	2.07	864	2.9	3,752	358	706
	All procedures	111	1.00	29,619	100.0	267,645	25,536	8,270

over five times as great as outpatient payments).

Note that the category with the highest aggregate payment in this State was "dilation and curettage of uterus to terminate pregnancy." As noted previously, Federal funds can be used for abortions only if the woman's life is in danger, but States at their own option can cover abortions in less restrictive circumstances without Federal funds. Thus the aggregate payments in this category primarily reflect payments made only by the State.

The information requested in the mandate for high aggregate payment outpatient procedures in Tennessee is presented in Table 3.23.

- Five procedures on the high aggregate payment list also appeared on the high volume list (myringotomy; other reduction of fracture; suture of skin and subcutaneous tissue; operations on muscles, tendons, fascia, and bursa; other excision or destruction of lesion of skin and subcutaneous tissue). Two procedures on this list also appeared on the high average payment list (bilateral endoscopic destruction or occlusion of fallopian tubes, diagnostic dilation and curretage of the uterus). The three remaining procedures did not appear on either of the other two lists (colonoscopy and other endoscopies, circumcision, and photocoagulation of retinal detachment or lesion).
- The ten high aggregate payment procedures account for a large share of the overall payments for outpatient procedures (52 percent).
- Like Georgia, aggregate payments for inpatient procedures were far greater that aggregate payments for outpatient procedures (almost 17 times as great).

Table 3.23
High Aggregate Payment Outpatient Procedures in the Medicaid Population,
Tennessee, 1984

		Payment Rate		Aggregate Payments		Rate of Performance		Physcians
Rank	Procedure	Average $	Ratio to Overall Average	Aggregate $ (in '000)	% of Total	Number Performed	Rate per 100,000 Enrolled	Number
1	Bilateral endoscopic destruction or occlusion of fallopian tubes	1,005	6.84	278	9.3	277	86	48
2	Myringotomy	480	3.27	272	9.1	568	176	124
3	Colonoscopy and other endoscopies	296	2.01	166	5.5	560	173	190
4	Other reduction of fracture	188	1.28	161	5.4	858	266	267
5	Suture of skin and subcutaneous tissue	86	.59	161	5.4	1,865	577	463
6	Operations on muscles, tendons, fascia, and bursa	59	.40	126	4.2	2,124	658	394
7	Diagnostic dilation and curettage of uterus	784	5.34	125	4.2	160	50	91
8	Other excision or destruction of lesion of skin and subcutaneous tissue	41	.28	116	3.9	2,797	866	681
9	Circumcision	302	2.05	91	3.1	303	94	110
10	Photocoagulation of retinal detachment or lesion	582	3.96	68	2.3	116	36	26
	All procedures	147	1.00	2,990	100.0	20,201	6,254	2,046

Table 3.24 presents the overlap of high aggregate payment procedures in our sample States. There is a sizeable overlap in the procedures that are high in aggregate payment:

- Only 15 unique procedures appeared on the lists of high aggregate payment procedures.
- Seven of the 15 procedures appeared in all three States (myringotomy; colonoscopy and other endoscopies; bilateral endoscopic destruction or occlusion of fallopian tubes; diagnostic dilation and curretage of uterus; other reduction of fracture; operations on muscles, tendons, fascia, and bursa; other excision or destruction of lesion of skin and subcutaneous tissue). One additional procedure appeared on the lists of two States (incision of skin and subcutaneous tissue).
- The remaining seven procedures only appeared on the list of one State (tonsillectomy with adenoidectomy, laparoscopy, biopsies and other endoscopies of the digestive system, circumcision, dilation and curettage of uterus to terminate pregnancy, suture of skin and subcutaneous tissue, photocoagulation of retinal detachment or lesion).

In summary, several points stand out from our analysis of high volume and high payment outpatient procedures. We found substantial overlap between the sample States in the procedures that were high in volume, and the top ten procedures accounted for a large share of the overall outpatient volume in the States. However, the high volume outpatient procedures tended to be very low in average cost, and most would not be particularly appropriate for a second opinion program.

Table 3.24
Overlap of High Aggregate Payment Outpatient Procedures,
Tape-to-Tape States, 1984

Procedure	Rank		
	Georgia	Michigan	Tennessee
Myringotomy	2	7	2
Tonsillectomy with adenoidectomy	-	8	-
Colonoscopy and other endoscopies	4	10	3
Laparoscopy	5	-	-
Biopsies and other endoscopies of the digestive system	7	-	-
Circumcision	-	-	9
Bilateral endoscopic destruction or occlusion of fallopian tubes	9	4	1
Diagnostic dilation and curettage of uterus	1	3	7
Dilation and curettage of uterus to terminate pregnancy	-	1	-
Other reduction of fracture	6	6	4
Operations on muscles, tendons, fascia, and bursa	10	9	6
Incision of skin and subcutaneous tissue	8	5	-
Other excision or destruction of lesion of skin and subcutaneous tissue	3	2	8
Suture of skin and subcutaneous tissue	-	-	5
Photocoagulation of retinal detachment or lesion	-	-	10

The overlap in outpatient procedures that were high in average payment was not as great as for the high volume procedures. Procedures on the eyes were notable on this list.

The top ten aggregate payment procedures accounted for a large share of the total payments for all outpatient procedures in our sample States. Procedures that were on the high aggregate payment lists also tended to appear on the high volume list, though not to the extent seen on the inpatient side.

In Section 5 we will tie these inpatient and outpatient results to a discussion of procedures that may be appropriate for a mandatory second surgical opinion program. Prior to this, however, we will address the second topic raised in the mandate.

SECTION 4. RESEARCH RESULTS, ISSUES IN ACCESS

The second general topic that the mandate asked us to address relates to issues in access in mandatory second surgical opinion and preadmission review programs. Specifically, paragraph 1.E of the mandate requests information on the extent to which mandatory second opinion programs impede access to necessary care and services, and what measures States have taken to address such impediments, particularly in rural areas. We will address this topic by drawing on our review of the literature on second opinion programs and on our survey of State Medicaid agencies.

To organize our discussion, we note the following ways in which a second opinion program possibly could impede access:

- o forcing patients to travel unusual distances to seek second opinions for care,
- o delaying the patient from immediate care by requiring him/her to take time to obtain a second opinion,
- o deferring what could be necessary surgery when a second opinion does not confirm the first.

There is little evidence in the literature on whether such factors are actually problematic.

With respect to the first possibility, Williams et al. (1983) found that over 80 percent of the population that does not live in towns or lives in towns of fewer than 25,000 people are within 25 miles of a board-certified general physician as of 1979. The study was based on the location of physicians in all or parts of the following States: Maine, New Hampshire, the most northern part of New York, Vermont, Wisconsin, Idaho, Montana, North Dakota, Wyoming, Alabama, Arkansas, Louisiana and Mississippi.

With respect to the second possible impediment to access, Poggio et al. (1985) studied the length of time it took patients recommended for surgery to go through the mandatory second opinion program in Massachusetts. For those obtaining at least one consultation under the Massachusetts plan, the average time spent going through the program was 18 days.

Poggio et al. (1985) explored the third possibility noted above by observing the relative changes in surgery rates among confirmed and nonconfirmed participants in the New York and Michigan Medicare second surgical opinion program demonstration, based on surgery experiences of the program's first 2 years of participants. These followup data were used to do life table analysis. In New York the proportion of participants having had surgery increased by approximately the same number of percentage points in the period following the first year from program contact for both the confirmed and nonconfirmed participants. In Michigan, 34 percent of the surgery in nonconfirmed cases took place in the second year after contact, while no surgery took place among confirmed cases during the second year. The number of cases is sufficiently small that the increases after the first 12 months are not statistically significant. These researchers conclude that they could find no clear evidence that nonconfirming second opinions lead to delayed surgeries, or if such delay occurs, it is a delay of more than the 2 1/2 year followup period of the study. However, to firmly establish the magnitude of the delay, one would have to compare delays with a second opinion program to delays without a program; the above data do not permit this comparison.

States can address potential impediments by including waivers in their program, under which a person recommended for surgery is not required to obtain a second opinion in certain circumstances. In our survey of State Medicaid agencies, seven States that had mandatory second opinion programs responded to queries about waivers that are included in their programs. Conditions under which waivers are granted in these States are presented in Table 4.1.

Conditions cited by these States under which they waive the requirement to obtain a second opinion are: the patient is in pain or at risk, the patient lives too far from a provider, the patient is enrolled in a managed care program, the patient is eligible for Medicare, the patient is determined to be Medicaid eligible after the surgery is performed, a qualified physician or specialist is unavailable, obtaining the second opinion would cause some severe hardship, the patient is covered under private insurance and has obtained a second opinion under this insurance, or if the procedure is incidental to a more major procedure.

There is little evidence available on the extent to which such waivers are utilized. Poggio et al. (1985) studied use of waivers in the Massachusetts program. They determined that 6 percent of all cases in this State received hardship waivers. (Gertman et al. (1980) indicated that 10.5 percent of the Massachussets population they studied received waivers for endangering conditions; Poggio et al. are referring to waivers for difficulty in accessing a provider for a second opinion.) Four procedures accounted for a disproportionate share of the waivers: hysterectomy, cholecystectomy, laminectomy, and hemorrhoidectomy. Travel hardships accounted for only 4 percent of all waivers issued. Data from

Table 4.1
Conditions Under Which States Waive the Requirement
to Obtain a Second Surgical Opinion

Conditions	State 1/						
	Massachusetts	Michigan	Missouri	New Jersey	Tennessee	Virginia	Washington
Patient in pain or at risk	X	X	X	X	X	X	X
Patient lives too far from provider	X	X		X	X		X
Patient is enrolled in managed care program		X	X		X		X
Patient is eligible for Medicare		X			X		X
Patient is determined to be Medicaid eligible after the surgery is performed		X	X		X		X
Qualified physician or specialist is unavailable		X				X	X
Obtaining second opinion would cause severe medical hardship	X	X					case by case
Patient also covered by private insurance and has obtained a second opinion under this insurance		X			X	X	
If procedure is incidental to a more major procedure					X	X	

1/ Colorado, Minnesota, Oregon, South Carolina and Wisconsin also have mandatory second surgical opinion programs. Colorado, Minnesota, Oregon and Wisconsin did not respond to this part of the survey, and South Carolina stated that it had no formal waivers. Massachusetts did not respond to the survey, but we were able to obtain the waivers included in its program from Poggio et al (1985).

Massachusetts, however, are not likely to be representative of more sparsely populated States or States with fewer physicians.

In summary, the literature is sparse on the actual extent to which mandatory second opinion programs impede access to necessary care. We did not find evidence that these program do impede access, but firm conclusions cannot yet be drawn. The inclusion of waivers is a method used by States to attempt to address potential impediments to necessary care.

SECTION 5. RESEARCH RESULTS, CANDIDATE PROCEDURES FOR A MANDATORY SECOND SURGICAL OPINION PROGRAM

The third general topic in the mandate asked us to identify surgical procedures that may be appropriate for a mandatory second surgical opinion program in Medicaid, considering factors about the procedures such as risk, cost, volume, nonconfirmation rates, and geographic variation (see paragraphs 2A. through 2C. of the mandate). We will address this topic by drawing on our survey of State Medicaid agencies, analysis of claims data, and review of relevant literature.

A logical place to start in identifying procedures that may be appropriate for a mandatory second opinion program is to consider the experience of programs currently in operation under Medicaid. Twelve States currently have mandatory second surgical opinion programs in their Medicaid program: Colorado, Massachussets, Michigan, Minnesota, Missouri, New Jersey, Oregon, South Carolina, Tennessee, Virginia, Washington, and Wisconsin. In our survey of State Medicaid agencies we asked these States to identify procedures for which second opinions were required in their program. We were able to obtain information for 10 of the 12 States (we did not obtain procedures for Minnesota or Oregon). Table 5.1 summarizes the procedures that are included in current second opinion programs. A total of 38 procedures are included in at least one current program. All ten of the reporting States cover hysterectomies. Nine of the States cover cholecystectomy and tonsillectomy/adenoidectomy. Seven States cover hernia repair, and six cover hemorrhoidectomy. Cataract extraction, dilation and curettage, laminectomy/laminotomy are covered by four States. Three States cover joint replacement (hip or knee) and spinal fusion. Two States cover arthrotomy, coronary artery bypass graft,

Table 5.1
Procedures Covered Under Current Mandatory
Second Surgical Opinion Programs

Procedure	State 1/										Total
	CO	MA	MI	MO	NJ	SC	TN	VA	WA	WI	
Athroscopy	x										1
Arthrotomy	x		x								2
Breast surgery (except biopsy)	x										1
Bunionectomy				x							1
Cataract extraction	x		x	x						x	4
Caesarean section (elective)								x			1
Cholecystectomy	x		x	x	x	x	x	x	x	x	9
Colporrhapy, anterior and posterior				x							1
Coronary angiography	x										1
Coronary angioplasty	x										1
Coronary artery bypass graft	x							x			2
Dilation and Curettage			x	x				x		x	4
Disk surgery					x						1
Ethmoidectomy			x								1
Gastroplasty	x										1
Hemorrhoidectomy		x	x	x			x	x		x	6
Hernia repair			x	x	x	x	x		x	x	7
Hysterectomy	x	x	x	x	x	x	x	x	x	x	10
Joint replacement (hip or knee)	x							x		x	3
Knee surgery	x										1
Laminectomy/laminotomy		x		x				x			4

CONTINUED

Table 5.1, continued
Procedures Covered Under Current Mandatory
Second Surgical Opinion Programs

Procedure	State 1/ CO	MA	MI	MO	NJ	SC	TN	VA	WA	WI	Total
Lumbar laminectomy and dissectomy	x										1
Maxillectomy			x								1
Meniscectomy		x	x								2
Myelogram	x										1
Myringotomy			x	x							2
Oophorectomy	x										1
Osteotomy				x							1
Pacemaker	x										1
Sinusotomy			x								1
Spinal fusion	x		x		x						3
Submucos resection nasal septum		x	x								2
Surgeries of the feet			x								1
Surgical intervention for thoracic outlet syndrom	x										1
Tonsillectomy/adenoidectomy	x	x	x	x	x		x	x	x	x	9
Transurethral resection								x			1
Tympanostomy			x	x							2
Varicose veins, excision		x								x	2
Total	19	7	17	13	6	3	5	10	4	9	

1/ Minnesota and Oregon also have mandatory second surgical opinion programs. Minnesota did not respond to the survey. Oregon did not report specific procedures covered. Their PRO determines on a case by case basis which procedures will require a second opinion for specific patients. Massachusetts did not respond to the survey but we were able to obtain the procedures included in its program in 1982 from Poggio et al. (1985).

meniscectomy, myringgotomy, submucos resection of nasal septum, tympanostomy, and excision of varicose veins. The remaining 21 procedures are covered by only one of the reporting States.

Let us now consider this list of procedures included in current programs with respect to the criteria suggested in the mandate. The first criterion is that the procedure is one which generally can be postponed without undue risk to the patient (see paragraph 2A.). The procedures included in current programs represent procedures that the States believe can be postponed without undue risk. Further, all States provide that no second opinion is required if the procedure must be performed on an emergency basis.

The second criterion suggested by the mandate is that the procedure is a high volume or high cost procedure (see paragraph 2B.). This criterion is useful because it helps identify procedures that may have high payoff in terms of program savings and patient service. Many of the procedures included in current mandatory second opinion programs appeared on the high volume or high payment lists from our analysis of Medicaid claims data in Section 3. Table 5.2 summarizes this overlap. In all, 14 of the 38 procedures included in current programs also appeared on one of the high volume or high payment lists. Of these, eight of the ten procedures that appeared in three or more of the current programs also appeared on one of the high volume or high payment lists (cataract extraction, cholecystectomy, dilation and curretage, hernia repair, hysterectomy, joint replacement, spinal fusion, tonsillectomy/adenoidectomy). Six of the 28 procedures that were included in only one or two of the current programs also appeared on one of the high volume or high payment lists (Caesarean section, coronary

Table 5.2
Procedures in Current Second Surgical Opinion Programs
That Appeared on High Volume or High Payment Lists

	High Volume or High Payment List					
	Inpatient			Outpatient		
Procedure	High Volume	High Average Payment	High Aggregate Payment	High Volume	High Average Payment	High Aggregate Payment
Cataract extraction					X	
Caesarean section (elective) 1/	X		X			
Cholecystectomy	X		X			
Coronary angioplasty 2/		X				
Coronary artery bypass graft 3/		X				
Dilation and curettage 4/	X				X	X
Hernia repair	X		X		X	
Hysterectomy	X		X			
Joint replacement (hip or knee)		X				
Myringotomy				X		X
Oophorectomy			X			
Sinusotomy					X	
Spinal fusion		X				
Tonsillectomy/adenoidectomy	X		X			X

1/ Elective Caesarean sections can not be identified separately in the claims data. Caesarean section on the high volume and high aggregate payment lists thus includes elective and nonelective Caesareans.
2/ Coronary angioplasty is included in the category Other Open Heart Operations in the high average payment list.
3/ Coronary artery bypass graft is included in the category Direct Heart Revascularization in the high average payment list.
4/ Dilation and curettage refers to the category Diagnostic Dilation and Curettage of the Uterus in the claims data.

angioplasty, coronary artery bypass graft, myringotomy, oophorectomy, sinusotomy). Thus, procedures included in current second opinion programs tend to correspond to the high volume and high payment procedures identified from our analysis of Medicaid claims data, particularly procedures included in three or more current programs. Recall also that our analysis of claims data was based on only three States. Additional procedures on the list of procedures included in current programs may be high volume or high payment in other States.

The third criterion cited in the mandate is that the procedure has a comparatively high rate of nonconfirmation upon examination by another physician (see paragraph 2C.). This criterion is useful because it helps identify procedures for which there may be ambiguity in the indicators for surgery. It may not be cost effective to require second opinions for procedures with very low nonconfirmation rates. From our survey of State Medicaid agencies we found that only four States with mandatory second opinion programs collect information on nonconfirmations (Massachussetts, Michigan, New Jersey, and Wisconsin). We were able to obtain nonconfirmation rates for Massachussets, New Jersey and Wisconsin. Table 5.3 presents this information.

Six of the 13 procedures for which we have data generally had nonconfirmation rates that were around 10 percent or more: dilation and curretage (10.3 in Wisconsin), hemorrhoidectomy (11.9 in Massachusetts, but only 8.4 in Wisconsin), hysterectomy (10.2 in Massachusetts, 14.9 in Wisconsin, but only 6.5 in New Jersey), laminectomy/disk excision (25.6 in Massachusetts, 19.4 in New Jersey), submucous resection of nasal septum (13.1 in Massachusetts), vericose vein ligation/excision (10.1 in Massachusetts, 15.8 in Wisconsin). Nonconfirmation rates were generally

Table 5.3
Nonconfirmation Rates in the Medicaid Population
for Selected States with Mandatory Second Surgical Opinion Programs

Procedure	Massachusetts, 1981-1982	New Jersey, 1986-1987	Wisconsin, 1981-1983
Cataract extraction	-	-	3.8
Cholecystectomy	4.4 1/	1.3	4.7
Dilation and curettage	-	-	10.3
Hemorrhoidectomy	11.9	-	8.4
Hernia repair	-	5.9	4.2
Hysterectomy	10.2	6.5	14.9
Joint replacement (hip or knee)	-	-	6.6
Laminectomy/disc excision	25.6	19.4	-
Meniscectomy	7.8	-	-
Submucous resection of nasal septum	13.1	-	-
Tonsillectomy/adenoidectomy	5.6	2.8	6.9
Transurethral resection, prostate	-	-	6.9
Varicose vein ligation/excision	10.1	-	15.8
All procedures	8.0	3.7	8.1

1/ Massachusetts dropped its requirement to obtain second opinions for cholecystectomies in 1981. The value presented is the nonconfirmation rate for the period 1977 through 1980.

around 5 to 10 percent for hernia repair (5.9 in New Jersey, 4.2 in Wisconsin), joint replacement (6.6 in Wisconsin), meniscectomy (7.8 in Massachusetts), tonsillectomy/adenoidectomy (5.6 in Massachusetts, 6.9 in Wisconsin, but only 2.8 in New Jeresy), and transurethral resection of prostate (6.9 in Wisconsin). Two procedures had nonconfirmation rates that were consistently below 5 percent: cataract extraction (3.8 in Wisconsin), cholecystectomy (4.4 in Massachusetts, 1.3 in New Jersey, 4.7 in Wisconsin). The overall nonconfirmation rate for all procedures was approximately 8 percent in Massachusetts and Wisconsin, but was lower in New Jersey (3.7 percent).

Unfortunately the States do not provide information on the cost effectiveness of procedures with different nonconfirmation rates. However, in no case is the nonconfirmation rate consistently so low that it is obvious that it would not be cost effective to require second opinions. From the data that are available, we therefore cannot with confidence eliminate procedures from the list because of excessively low nonconfirmation rates.

The final criterion cited in the mandate relates to geographic variation in the rates of performance of the procedures. Geographic variation in rates of performance can be interpreted in a number of ways. On the one hand, it can be interpreted as indicating ambiguity in the conditions under which the procedure should be performed, and may thus point to procedures for which a mandatory second opinion program may be appropriate. On the other hand, geographic variation in rates of performance could simply reflect differences in local conditions (e.g., composition of the population) that generate different requirements for performance of the procedure. Though its meaning is not clear, variation

in rates of performance of procedures has been studied both between and within States (see, for example, Barnes et al., 1985; Griffith et al., 1985; Wennberg and Gittelsohn, 1975). However, virtually no current literature focuses explicitly on geographic variation in rates of performance of procedures in the Medicaid population. Section 9432(c) of OBRA-86 mandates a companion study to the present report that is to examine geographic variation in procedures in Medicaid. In that study we will present detailed information on geographic variation in rates of performance of selected procedures in Medicaid.

In summary, the list of procedures included in current mandatory second surgical opinion programs reasonably addresses the major criteria suggested in the mandate: it represents procedures that the States believe can be postponed without undue risk to the patient; it overlaps with the lists of high volume and high payment procedures identified in our analysis of Medicaid claims data (e.g., eight of the ten procedures that appeared in three or more current programs also appeared on one of the high volume or high payment lists); and nonconfirmation rates were not so low that procedures obviously should be excluded from the list.

Note, however, that this list should not be considered exhaustive. Additional surgical procedures may meet the criteria in other States. In addition, not all of these procedures would be appropriate in all States, as is indicated by the variation in the number of States including the procedures. Nevertheless, the list does represent a reasonable pool of potential procedures that could be appropriate for a mandatory second surgical opinion program.

SECTION 6. SUMMARY AND CONCLUSIONS

Under section 9432(b) of OBRA-86, Congress mandated that the Secretary of the Department of Health and Human Services provide information pertaining to second surgical opinion and preadmission review programs in the Medicaid program. The mandate can be broken down into three basic topics:

- First, it calls for information such as payment rates, aggregate payments, and rates of performance for high volume and high cost surgical procedures in the Medicaid population.
- Second, it calls for information on the extent to which second surgical opinion or preadmission review programs may impede access to necessary care, and the measures States have taken to address such impediments.
- Third, the mandate states that the Secretary should identify surgical procedures that may be appropriate for a mandatory second surgical opinion program under Medicaid, considering factors about the procedures such as potential risk, volume, cost, nonconfirmation rates, and geographic variation.

This report responds to the congressional mandate.

To address these topics, we engaged in several research activities. We reviewed and synthesized existing literature on second surgical opinion and preadmission review programs. We also conducted a survey of all State Medicaid agencies to obtain information on second surgical opinion and preadmission review programs currently in operation. Finally, we obtained all claims paid by Medicaid for a sample of States (Georgia, Michigan, and Tennessee), including information on procedures performed and payments made by Medicaid.

There are several limitations about our research approach that should be noted. First, the sample of States used in our analysis of high volume and high payment procedures is not necessarily representative of all State Medicaid programs. However, the Tape-to-Tape data base contains the only claims-level Medicaid data that are readily available and, even though not necessarily representative, results from this sample of States can provide a useful general indicator of the high volume and high payment procedures that may be found in the Medicaid population.

Another potential limitation of our high volume and high payment analysis is that it is based on data from 1984. It is possible that patterns of utilization and payment in Medicaid have shifted since that time. For example, rates of performance in the entire U.S. population have changed for some procedures in the period since 1984. Examples of procedures whose rates have changed somewhat in the inpatient setting include the following (NCHS, 1986; 1987): tonsillectomy with or without adenoidectomy has decreased from 107 to 88 per 100,000 in the population; cholecystectomy has declined from 166 to 156 per 100,000 in the population; inguinal hernia repair has declined from 118 to 74; bilateral destruction or occlusion of fallopian tubes has decreased from 440 to 372; hysterectomy has declined from 378 to 350; Caesarean section has increased from 736 to 798.

We also note difficulties inherent in the procedure coding used in our high volume and high payment analysis. As noted previously, procedures in our claims files are coded using the ICD-9-CM and CPT-4 coding systems, and these systems are very specific. There are a number of ways of combining individual codes from these systems to produce procedure categories that can be useful for identifying high volume and

high payment procedures. We adopted categories developed by NCHS for the ICD-9-CM system, but other researchers could opt for a different categorization scheme. In addition, mapping CPT-4 codes into the ICD-9-CM categories proved to be very difficult. Those using results from our categorization scheme should be careful that the mapping we used meets their specific requirements.

Note also that in identifying procedures that may be appropriate for a mandatory second surgical opinion program, we relied on procedures that were identified from our survey of State Medicaid agencies as being included in a second opinion program currently in operation. Recall that we developed a list of 38 unique procedures from the ten States that provided such information. The list of procedures from these ten States should not be considered exhaustive. Medicaid programs can differ in many ways (e.g., eligibility requirements and enrollee characteristics, coverage limitations, reimbursement systems), so additional procedures may be appropriate in other States. In the same vein, not all of the procedures on our list should be considered appropriate for all States.

With these limitations in mind, we will now summarize our research results.

In response to the first topic raised in the mandate, we analyzed the claims data to produce information on high volume and high payment procedures in the Medicaid population. We analyzed inpatient and outpatient procedures separately. With respect to inpatient procedures several points stand out. We found substantial overlap between our sample States in the inpatient procedures that were high in volume, and obstetric procedures were prominent on the lists. In addition, the overall inpatient volume tends to be concentrated in a few procedures. The top

ten procedures in terms of volume accounted for between 50 and 63 percent of the total volume of inpatient procedures in our sample States. Though there was substantial overlap in the procedures that appeared on the high volume lists, variation in actual rates of performance among the sample States and the comparison group was also evident.

Major operations of the cardiovascular system were prominent on the list of high average payment inpatient procedures. There was quite a bit of variation in actual average payments, with the payments in Michigan higher than in the other two States.

Though not as great as with the high volume list, there was still considerable overlap between the States in inpatient procedures that were high in aggregate payment. A procedure can be high in aggregate payment because it is high in volume, or high in average payment, or moderate to high in both. In our sample States, the high aggregate payment inpatient procedures tended to be procedures that were high in volume. Finally, inpatient aggregate payments were concentrated in a few procedures. The top ten procedures in terms of aggregate payment accounted for between 39 and 54 percent of the total payments for inpatient procedures in our sample States.

Several additional points stand out from our analysis of high volume and high payment outpatient procedures. We found a sizeable overlap between the sample States in the procedures that were high in volume, and the top ten procedures accounted for a large share of the overall outpatient volume in the States (between 61 and 68 percent). However, the high volume outpatient procedures tended to be very low in average payments; many of these procedures were probably associated with minor accidents and the like.

The overlap in outpatient procedures that were high in average payment was not as great as for the high volume procedures. Procedures on the eyes were prominent on this list.

The top ten aggregate payment procedures accounted for a large share of the total payments for all outpatient procedures in our sample States (between 47 and 56 percent). Procedures that were on the high aggregate payment lists also tended to appear on the high volume list, though not to the extent seen on the inpatient side.

In response to the second topic raised in the mandate, we found that the literature is sparse on the extent to which mandatory second opinion programs impede access to necessary care. We did not find evidence that these programs do impede access, but firm conclusions cannot yet be drawn.

States often attempt to address potential impediments by including waivers in their program under which a person recommended for surgery is not required to obtain a second opinion. We found waivers granted under the following conditions in one or more current programs: the patient is in pain or at risk; the patient is too far from a provider; the patient is enrolled in a managed care program; the patient is eligible for Medicare; the patient is determined to be Medicaid eligible after the surgery is performed; a qualified physician or specialist is unavailable; obtaining the second opinion would cause some severe hardship; the patient is covered under private insurance and has obtained a second opinion under this insurance; the procedure is incidental to a more major procedure.

In response to the third topic in the mandate, we attempted to identify procedures that may be appropriate for a mandatory second surgical opinion program by examining procedures that are included in second opinion programs currently in operation in State Medicaid plans. A

total of 38 procedures were included in at least one current program. We found that this list of procedures reasonably addressed the major criteria suggested in the mandate: it represents procedures that the States believe can be postponed without undue risk to the patient; it overlaps with the lists of high volume and high payment procedures identified in our analysis of Medicaid claims data (eight of the ten procedures that appeared in three or more current programs also appeared on one of the high volume or high payment lists); and nonconfirmation rates were not so low that it was obvious that procedures should be excluded from the list. Thus, although the procedures on this list are not exhaustive nor are all of them necessarily applicable in all States, they do represent a reasonable pool of potential procedures that may be appropriate for a mandatory second surgical opinion program.

Note, however, that much remains to be learned about procedures performed in the Medicaid population. Section 9432(c) of OBRA-86 mandated a companion study to this report that will complement the issues discussed here. In that study, which is due January 1, 1990, we will further research the utilization of medical treatments and surgical procedures by Medicaid beneficiaries, particularly focusing on issues of appropriateness, necessity and effectiveness of such treatments and procedures.

APPENDIX A

Background on Second Opinion Programs

A.1 INTRODUCTION

In this appendix we review and synthesize existing literature on second opinion programs. We attempted to find separate bodies of literature for second surgical opinion and preadmission review programs. We found a number of studies that examined second surgical opinion programs (SSOPs), but we were not able to find published studies that evaluated preadmission review programs separately. We therefore focus on SSOPs. This review provides background and context for the analyses presented in this report.

Concern over rising health care costs and the proportion of health care expenditures directed to hospitalizations stimulated payors to develop SSOPs, inpatient hospital preadmission review, and other utilization review programs in the early 1970s. From 1965 forward, with the exceptions of 1973 and 1984, health care expenditures as a percent of Gross National Product (GNP) have increased every year to 11.2 percent of GNP in 1987. Of every dollar expended for personal health care services, 44.5 cents goes to the hospital and an additional 23 cents is spent on physician services. If, as is estimated, one-third of hospital and physician costs are related to surgery, then the costs of surgery absorb approximately 23 cents of every health care dollar.

The number of surgical operations has also been steadily increasing, from 3.3 million procedures per year in 1967 to more than 5.2 million procedures in 1986 (HCFA, 1987a), an average annual rate of 2.3 percent. This growth in the rate of surgical procedures considerably exceeds the 1.0 percent annual growth rate in population for the same period. This disproportionate growth in the rate of surgical procedures has been

attributed to several causes or combinations of causes, including:

- increased access to services, largely as a result of public payor programs such as Medicare and Medicaid;
- increase in the surgeon/population ratio, from 30.1 per 100,000 population in 1965 to 40 per 100,000 population in 1985; and
- increasingly sophisticated medical and surgical technologies that permit a broader range of therapeutic interventions for diseases and conditions.

SSOPs were first introduced in 1972, based on the belief that too many surgeries were being performed, further fueling the increases in health care costs. In addition, such programs could improve the quality of care by reducing the risk to the patient of questionable surgery. Further, second opinions can give the patient a broader information base for making important decisions about whether to undergo surgery.

The first program, established in New York as a joint effort between Cornell-New York University Hospital and a Taft-Hartley benefit fund, was a voluntary program, meaning that insurance beneficiaries could choose whether to seek a second opinion before proceeding with surgery. This program, along with most voluntary programs, covered all elective surgical procedures, although some voluntary programs choose to cover only certain procedures. Most voluntary programs permit the patient to proceed with surgery, regardless of whether the second opinion confirms the first. Some may permit the patient to seek a third opinion if he or she wishes to do so.

A mandatory program, requiring beneficiaries to seek a second opinion if they wanted the insurance plan to pay for the surgery, was soon instituted by these same sponsors. Mandatory programs may cover all

surgical procedures, but it is more likely that mandatory programs will specifiy a set of procedures for which a second opinion is required. If the second opinion does not confirm the first, some mandatory programs may require a third opinion. Others require that a peer review or other utilization review body determine whether insurance will cover the procedure if the patient should proceed with surgery. Still others may permit the patient to proceed with surgery without further review or opinion.

Since the introduction of the first SSOP 16 years ago, other private insurers and some Medicaid agencies have instituted both voluntary and mandatory programs. Below we will review existing literature on such programs, but first we present the evalaution basis for the review.

A.2 EVALUATION BASIS FOR REVIEWING THE LITERATURE

The literature generated about SSOPs can be classified into three categories: studies of Medicaid programs (Massachusetts and Wisconsin); studies of other SSOPs, particularly the variety of programs that developed in New York, the cradle of SSOPs; and studies addressing related aspects of SSOPs, such as considerations in interpreting nonconfirmations.

To determine the extent to which SSOPs have contained health care costs and to identify the effects they have had on patient outcomes, the ideal program evaluation would:

- follow equivalent cohorts of individuals over time, one cohort that was exposed to an SSOP and a control group that was not;

- establish standard, comprehensive definitions of costs and outcomes of interest;
- follow changes in these variables over time; and,
- be on a large enough scale to detect, if present, changes in the rate at which physicians recommend surgery (i.e., the so-called sentinel effect).

We discuss each of these criteria next.

A.2.1 Use of a Control Group

In order to know the effect of a program on an individual's decision to seek a second opinion, the study should have a control group against which to measure the effect among those with access to the SSOP. Randomization or one of its variants in assigning participants to a study or control group provides the best method for studying SSOP effects. In randomization, study participants are randomly assigned to be in a group that participates in an SSOP or in a group that does not. However, randomization may not be possible in many situations.

An alternative, less desirable than the use of randomization, is to establish a nonequivalent control group, from a similar geographic area, for example, to use for purpose of comparison. For example, the two different populations that participate in voluntary and mandatory programs could be compared. Because of the self-selected nature of those who are in the groups, this design is not optimal for comparing information on cost and other program effects.

A study that looked at the changes in effects on a population before and after the implementation of an SSOP is another option for structuring

a type of control group. However, other changes occurring at the same time as the implementation of the SSOP can make interpretation of effects difficult.

A.2.2 Cost and Outcome Definition

The determination of costs of and savings attributed to the SSOP should include the following dimensions:

- cost of designing, establishing and operating the SSOP;
- cost of alternative surgeries or alternative medical treatments offered immediately in lieu of the initially recommended surgery;
- downstream medical costs that the patient who defers surgery as a result of the SSOP may experience (this will also include the costs of the surgery if it is performed later);
- costs to the patient and/or employer for his/her time, travel costs and other expenses related to obtaining a second opinion; and
- savings from unneeded surgeries, including costs of hospital stays, physicians' fees, bad medical outcomes (e.g., operative mortality) and other related costs.

Patient outcomes that are used to evaluate an SSOP should be comprehensive, drawn from both self-reported data and a physician's assessment of outcomes. Self-reported patient outcomes include functional status, i.e., the patient's ability to perform self-care activities, his/her mobility, and the ability to perform physical, role, household and leisure activities, as well as the individual patient's

assessment of his/her general health. Joffe (1980) suggests that outcome measures could include: difference in mortality, change in activity level, change in perceived levels of health, recurrence of condition, and complications from both surgery and alternative medical treatment.

A.2.3 Changes in Study Variables Over Time

The effects on patient health of avoiding a surgery are not conclusive at the point that the option of surgery is rejected but, in fact, develop over time. The patient may, at the point of a nonconfirming second opinion, defer the surgery temporarily but ultimately have the procedure performed, a factor that influences both the cost measurement and the assessment of health outcomes. For these reasons, the study should be a longitudinal study to best measure the effects of an SSOP on quality of care and on cost.

A.2.4 Large Scale Study

The ideal SSOP evaluation should enable one to determine the direct effects of the program in reducing surgeries and thus containing costs, as well as the indirect effects, particularly the sentinel or deterrent effect, of the program in reducing surgeries. The direct effect of a program is the extent to which it influences patients to seek or to avoid surgeries, based on the opinion of more than one physician. The most recognized indirect effect of SSOPs, the so-called sentinel effect, is the effect that physician awareness of the program has in reducing the number of surgeries recommended or the number of referrals made.

Next we will examine the three categories of SSOP literature--Medicaid SSOPs, non-Medicaid SSOPs, and other related topics--using these criteria. We will conclude with a brief history of congressional interest in SSOPs.

A.3 LITERATURE ON MEDICAID SSOPS

Twelve mandatory Medicaid programs are currently in operation. Two of these, the Consultation Program for Elective Surgery (CPES) in Massachusetts, and the SSOP in Wisconsin, are addressed in the published literature. The Massachusetts CPES, the oldest continuous Medicaid SSOP, was established in 1976; the Wisconsin program followed in 1981.

A.3.1 Massachusetts Medicaid Program (CPES)

Gertman, et al. (1980), Martin (1982), Martin et al. (1982), and Poggio et al. (1985) have all studied the Massachusetts CPES program. CPES uses two different program models, administered by five Peer Review Organization (PRO) type foundations. Three regions use a "hands-on" model in which patients referred to the program are examined by a foundation-assigned surgeon who assesses the need for the proposed operation. The other two regions use a "desk audit" model in which proposed patients are screened by the foundation, using preset criteria developed by area physicians in consultation with the CPES-administering Department of Public Welfare. Those patients not meeting the proposed criteria as well as their referring physician are notified by the foundation that a hands-on consultation is required if the patient is still interested in having the proposed surgery (Martin, et al., 1982).

Gertman, et al. (1980) looked at the first year of data for the CPES and reported data on one procedure, hysterectomy, of the eight that the program mandatorily covers. They claimed that the CPES did influence which patients actually had surgery on the grounds that patients who received a confirming second opinion for hysterectomy were much more likely to undergo the surgery than those who received a nonconfirming second opinion. Although this finding is strongly suggestive, it does not definitively prove Gertman et al.'s claim, because even without an SSOP, those who were confirmed may have been more likely to have received surgery. Because of the short study period and the newness of the program, they were not able to determine whether the CPES had a sentinel or other indirect effects.

Only a limited cost analysis was possible at the time of Gertman et al.'s study. They focused their analysis on 49 women with negative second opinions regarding the need for a hysterectomy, and estimated a benefit/cost ratio of 2.27. This estimate is based on an assumption that the 26 patients who were not approved and did not have surgery would have gotten surgery in the absence of the program. However, because the study lacks a control group, the soundness of this assumption could not be demonstrated. Note also that these calculations overestimate the net benefits to some extent because they do not acccount for out-of-pocket costs to the patient, costs for diagnostic procedures performed by consultants, costs of program administration, or downstream medical and surgical costs for those who do not immediately undergo surgery.

A subsequent evaluation of CPES was performed by Martin (1982) and Martin et al. (1982), who used a nonequivalent control group in a 44 month interrupted time series study. Two distinct approaches were used

to examine the effect of CPES on the number of operations performed on the Medicaid population. First, the surgery decisions of all 2,501 persons referred to the program during a 1 year period were studied. Second, monthly surgery rates for each CPES procedure in each of the five regions over a 44 month period spanning CPES implementation were analyzed. They followed 59 percent of the patients for 1 year or more, 36 percent of the patients for 6 to 12 months, and 5 percent for 3 to 5 months. They found a 20 percent drop in surgery rates, compared to the year before CPES had been instituted, with 29 percent of this decrease attributed to the direct effects of the program and the remaining 71 percent of the decrease to the indirect or sentinel effects. These researchers noted that their approach in determining direct and indirect program effects may have overestimated the magnitude of the sentinel effect, because some of those confirmed for surgery who did not have it may have been affected by the program (i.e., some patients may defer or forgo surgery because of the information provided by the consultants or as a result of additional time to consider the decision), and some of the drop in rates concurrent with the installation of CPES may have been caused by other factors. (Of course, it is also possible that the drop in surgery rates may have been even larger, were it not for other factors; that is a weakness of a before and after design.)

The Martin studies estimated a benefit/cost ratio of 3.5 for the CPES, based on the analysis of data from two of the four regions that had the most data available. Estimates of cost are based on the comparison of two cohorts for 6 months; one cohort that had surgery (with surgical costs excluded) and one cohort that did not. The researchers, in their calculations of cost, did attempt to acount for the costs of alternative

surgeries and of alternative medical treatments up to 6 months post-consultation. Alternative surgical costs were estimated from actual Medicaid payments of related surgeries for program participants; alternative medical treatment costs for each procedure were estimated by comparing Medicaid payments for the sample of patients having surgery, less the surgery costs, with Medicaid payments for a sample of patients forgoing surgery.

The analysis was complicated by a 30 percent reduction of Medicaid surgery fees in February 1976. The researchers attempted to adjust for this problem by eliminating data prior to the fee cut in instances where the fee cut had a statistically significant impact on the monthly surgery rates.

Note that the cost calculations are not complete because they do not address any costs or benefits to patients or other insurers, nor do they consider downstream medical and surgical costs beyond the 6 month post-consultation followup.

The Poggio et al. (1985) study is the most comprehensive report of the Massachusetts CPES. Poggio et al. looked at both direct and indirect program effects, identified patient outcomes for those directly affected by the CPES, and defined costs more comprehensively than had other evaluations.

Poggio et al.'s study examined utilization over a 34-month period, from December 1979 through September 1982, and updates an earlier report on this program that was released in 1981. The Connecticut Medicaid population was used as a control group to determine the effect of CPES in reducing the surgery rate, taking into account that approximately 22 percent of the Connecticut Medicaid-eligible population sought second

opinions in the absence of any organized SSOP.

Poogio et al., based on indepth interviews with a sample of patients, estimated a 1.9 percent reduction in surgery rates among the participants. Poogio et al.'s study also looked at the patients confirmed for surgery who, were it not for CPES, would have forgone surgery, and found that 21 percent of this group was persuaded to have surgery as a result of this program. Individuals changing to surgery tended to be less healthy prior to treatment than individuals not having surgery. Negative health outcomes were found only among individuals choosing to forgo surgery. Poogio et al.'s study concluded that across the participant population there was virtually no CPES effect on health outcomes because the program caused relatively few individuals to change treatment, and because those who did change experienced little if any direct effect on health. Among those who did change, the slightly better than expected status of the patients persuaded to have surgery exceeded the slightly worse than expected health status of those discouraged from having surgery. The study emphasized that nothing is known about the effect of CPES on the health of the nonparticpants.

Poggio et al.'s study makes an important contribution to our understanding of the direct versus the indirect effects of an SSOP. Poggio found that only 10 percent of the reduction in surgical rates could be attributed to the direct effects of the program; the remaining 90 percent of the reduction stemmed from the indirect effects, about which very little is known. Further research is needed in this area.

This study found annual savings of about $110,000 (1979 dollars). Note, however, that the measure of cost used in this study is not complete. Although it accounted for administrative costs and estimated

expenditures for related surgeries, it did not include costs to the patient, nor discounted downstream medical and surgical costs.

With respect to downstream costs, the study found that there is little change in the cumulative level of surgery between 12 months and 34 months after program contact. About 78 percent of the patients underwent the CPES procedure within 1 year of the recommendation, 1 percent had related surgery, and 21 percent had no surgery at all. After a period of 34 months, the total having surgery had increased to only 81 percent.

These data may appear to show that downstream costs are unimportant. However, because savings attributed to second opinion programs must come from the group that did not undergo surgery, these data in fact point to the potential importance of downstream surgical costs. Fourteen percent ((81-78)/(100-78)=14%) of the group that did not initially undergo surgery did, in fact, have surgery in the 12-34-month interval and both that group and the remainder of the patients not undergoing the surgical procedure had an undetermined amount of medical treatment. Moreover, some individuals may have had subsequent medical and/or surgical treatment after the 34-month period.

A.3.2 Wisconsin Medicaid Program

The statute that established Wisconsin's Medicaid program in February 1981 mandated an evaluation within a year, which was to be the deciding factor in whether to maintain or terminate the program. The results of this evaluation, reported by Tyson (1985), are for only 7 months of data. A type of control was established by looking at data on common surgical procedures not covered by the Wisconsin program and

comparing changes in surgical rates between the two groups.

The overall surgical rate was estimated to have dropped 33 percent, because the control procedures did not show a commensurate drop. The monitoring efforts found that elective surgery rates were dropping regardless of the presence of an SSOP, though the researchers concluded that the SSOP hastened the drop. Ninety percent of the overall decrease in surgical rates was attributed to the sentinel effect, though how this was determined is not clear.

Savings to the Medicaid program were calculated, and the study concluded that the program returned $22 for every dollar expended. However, the short study time affected the calculation of costs: while the evaluation attempted to include the costs of developing and administering the program, it did not include any costs to patients, the costs of alternative medical or surgical treatments, nor any downstream medical or surgical costs.

A.4 LITERATURE ON NON-MEDICAID SSOPS

The literature on non-Medicaid SSOPs focuses on several programs: Cornell-New York University Hospital SSOP, the Program for Elective Second Surgical Opinion (PRESSO), the New York City Employees Program, and the New York and Michigan Medicare demonstrations. We will focus on each of these programs in turn.

A.4.1 Cornell-New York University SSOP

The McCarthy and Widmer (1974) evaluation of the first SSOP, the

voluntary program established by Cornell-New York University Hospital and a Taft-Hartley benefit plan, and their preliminary reports about the surgery that SSOPs appeared to deter, piqued the interest of the payor community as well as Congress. McCarthy and Widmer found a 24 percent nonconfirmation rate among their sample of 1,356 patients, and found that an addiitonal 2.1 percent of this population did not require hospitalization.

Emergency procedures and patients over the age of 65 were dropped from this study, provoking criticism from Lance and Haug (1978), among others, regarding the adequacy of the sample for making extrapolations. In addition, there was no control group against which to compare study results.

In a more comprehensive study McCarthy and Finkel (1978) studied both the voluntary and mandatory programs at Cornell to determine the necessity of recommended surgery. A study population was comprised of all 710 patients who had not been confirmed for surgery, of the 7,274 individuals who had participated in both programs since their inception.

A comparable population of 696 individuals among the total participant population who had been confirmed for surgery was selected at random for comparative purposes. The followup consisted of phone calls to the patients at the 6 and the 12-month interval. If no medical or surgical treatment was reported by those nonconfirmed in two consecutive calls (at the 12-month point), the patient was deemed asymptomatic and dropped from the study. At the 12-month point, 77.9 percent of those nonconfirmed had not had surgery and 64.4 percent of this group had not had medical treatment. The sentinel effect was reported to be the principal benefit

of the SSOP, although how this was determined is unclear.

Savings of more than $2 million were reported from one plan. Note however that these figures do not account for contemporaneous alternative medical or surgical treatments, costs to the patient such as time costs, or downstream medical and surgical costs.

McCarthy et al. (1977) analyzed the Cornell data further. Indirect savings or benefits from an SSOP were calculated by these researchers and included estimated savings from forgone mortality, work loss days, disability days and restricted activity days. (No actual savings figures were provided in this article.) These authors also tracked the number of patients who requested a third opinion, an option available to them under this SSOP. Only 16 of the 4,700 patients in the study had requested a third opinion.

Ruchlin et al. (1982), using a telephone-administered survey for a mandatory SSOP for a Taft-Hartley benefit fund, reported on the efficacy of SSOPs, focusing on those who were nonconfirmed for inpatient surgery. A comparable number of those who were confirmed was used as a control against which to determine costs, and each group was followed for a 1-year post-consultation period. Four groups of nonconfirmed patients were devised: no surgery, modified/alternative surgery, medical treatment and then original surgery, and originally recommended surgery. The study treated any recommendation emanating from the consultation process that could potentially lead to reduced health care expenditures, such as ambulatory surgery, as a nonconfirmation of the original recommendation for inpatient surgery.

These researchers concluded that their study supports the hypothesis that those who are nonconfirmed and do not seek either medical or surgical care are surplus surgery. They add that 90 percent of the

individuals who elect surgery in the 12 months following a second opinion will do so within 6 months of that opinion and so draw the inference that the vast majority of medical care costs and productivity losses occur within 1 year.

The conclusions that these researchers draw from their study are not definitive. The hypothesis that those who are not confirmed for surgery and who do not seek medical or surgical treatment constitute surplus surgery had to be weighed against the findings of an earlier study on the Cornell SSOPs indicating that there is a population that receives two confirming opinions for surgery who nevertheless do not obtain such surgery (McCarthy and Finkel, 1978). Hence, some of those who were not confirmed would not have been operated on in any event, but the surgery may well have been appropriate. Further, because their followup period was for only 1 year, the conclusion that the vast majority of medical care costs and productivity losses occur within 1 year of the consulting opinion is speculative.

Cost calculations in this study included program administration costs and expenditures related to rendering a second opinion. Nine categories of savings were created, and the benefit calculations included the avoidance of work loss and restricted activity days. Total program savings of $534,971 were estimated (medical care = $361,756 and productivity savings = $173,035) and the cost of the program was estimated at $203,300, resulting in a benefit/cost ratio of 2.63. The 2.63 benefit/cost figure, however, omits a number of factors: the cost of the second opinion, which would tend to lower the number; downstream medical and surgical costs which, if included, would tend to lower the number; the failure of health center physicians to always bill for

coinsurance, which means the program savings are somewhat overstated and that the 2.63 number is too high; and the failure of teaching hospitals to bill for the surgery, which would overstate the savings. The authors believe the net effect of these four biases underestimate the savings, but it is not clear why.

Grafe's (1978) study looked at both voluntary and mandatory programs at Cornell, following patients at 6-month intervals for a 2-year period. Grafe was especially interested in the issue of board certification of diagnosing and consulting physicians by specialty group, including orthopedics, gynecology, urology, ophthalmology, otolaryngology, and general surgery, and the extent to which second opinions confirmed first opinions among these groups. The subspecialties of orthopedics and gynecology demonstrated the highest rates of nonconfirmation; the most common reasons for not approving these operations was absence of pathology and failure to utilize medical therapy when indicated. We discuss some of the problems with the analysis of nonconfirmations in a subsequent section of this paper.

Pauly (1979) looked at the issue of unnecessary surgery in a larger context, but drew examples from New York studies that make his work relevant to this discussion. He drew from previous New York studies to make the point that projections developed from New York results should be used with caution because New York has a much higher rate of surgical procedures than the country as a whole.

A.4.2 Program for Elective Second Surgical Opinion

The Program for Elective Second Surgical Opinion (PRESSO), a

voluntary program sponsored by Blue Cross and Blue Shield of New York, was evaluated on a preliminary basis after its first 20 months of operation by Joffe (1980). Joffe was especially interested in variation in nonconfirmation rates by specialty and in the adequacy of self-reported data for making evaluative judgments, but also attempted to estimate cost savings.

He found statistically significant differences in nonconfirmation rates by surgical category, type of procedure and sex, with the highest rate of disagreement among urologists and the lowest rate among general surgeons.

Joffe's reported savings of $600,000 for the study period. However, his calculations are not complete in that they did not take into account the estimated $350,000 in program costs, the costs for alternative medical or surgical treatments, or downstream medical and surgical costs.

A.4.3 New York City Employees Program

A voluntary program instituted largely as a cost containment strategy for New York City government was evaluated by Paris et al. (1979), who were especially interested in nonconfirmation rates. The Paris et al. study found a high degree of agreement between the diagnosing and consulting physician (85.5 percent), but was unable to determine the costs and benefits of the program because of the lack of data on the medical expenditure experience of patients deferring and proceeding with surgery as well as health outcomes.

A.4.4 New York and Michigan Medicare Demonstration

For a 3-year period, beginning in 1978, voluntary SSOPs sponsored by Blue Cross/Blue Shield were available to Medicare beneficiaries in Detroit and in New York City to test Congress' interest in the cost-cutting potential of SSOPs. Poggio et al. (1985) found a very low participation rate (less than 2 percent), and they found that at least 65 percent of the New York program participants would have obtained a second opinion regardless of the existence of the program. In both New York and Michigan, the costs of the voluntary program, which did not even include downstream medical and surgical costs, exceeded the benefits.

A.5 OTHER TOPICS RELEVANT TO SSOPs

An array of research efforts have attempted to address questions of the effects of SSOPs on cost containment and on quality of care. In this section we will summarize other studies relevant to SSOPs.

A.5.1 Ability of SSOPs to Contain Costs

In addition to the studies cited above, the cost saving potential for providing second opinions was also studied by Graboys et al. (1987). These researchers studied candidates for coronary artery bypass grafts (CABG). They followed 88 self-selected patients for an average of 28 months. The study population was derived from 91 consecutive patients with coronary artery disease referred between December 31, 1979, and May 23, 1984. A program of medical therapy, as opposed to surgical intervention, was recommended for 74 of the 88 patients. Sixty patients

chose the medical therapy option. There were no fatalities in this group over a 27.8-month period, though two patients experienced myocardial infarctions. The remaining 14 patients elected to cross over to surgical therapy at an average of 11.3 months from the second opinion; these patients were followed for 24.7 months. None of these patients died; four experienced myocardial infarctions—three prior to surgery and one following coronary bypass.

Based on extrapolation of data from other sources, these researchers suggested that as many as 25,000 of the estimated 200,000 bypass procedures performed annually could be avoided and that foregoing this procedure could result in savings in excess of $500 million. The researchers concluded that second opinions for CABGs have merit and that a large proportion of patients will adhere to a recommendation against surgery provided that adequate psychological support, reassurance and communication with local physicians is carried out. It should be noted that there are costs associated with this alternate medical therapy, including substantial monitoring and consultation costs, but these costs were not included in Graboys et al.'s accounting.

A.5.2 Quality of Care Issues Related to SSOPs

In addition to potential cost savings, it is important to note quality of care issues related to SSOPs. If unnecessary surgery is reduced either through the second opinion itself or through the sentinel effect, then Medicaid recipients avoid needless risk. In light of such possibilities, a number of quality-related issues surface in the literature. We focus on four such issues:

- o the influence of a patient's utility on determinations of quality;
- o considerations in interpreting nonconfirmations;
- o whether low rates of surgery in one geographic area suggest higher quality of care than higher rates for the same surgery in another area; and
- o whether all physician consultants should be board certified.

Effect of Patient Utility on Quality. Recognizing that patients may quantify trade-offs between quality and quantity of life differently, McNeil et al. (1981) designed a study in which healthy males were asked, if given a diagnosis of carcinoma of the larynx, whether they would choose radiation treatment or surgery. Each therapy differs considerably in its effects on quality of life. The researchers were able to develop utility curves that describe patient preferences under varying sets of circumstances, and they concluded that patients' attitudes toward morbidity are important, since survival is not their only consideration. They suggest that major attempts should be made to incorporate patient's attitudes toward the quality and quantity of life into the decisionmaking process, which includes decisions about whether to proceed with surgery.

Considerations in Interpreting Nonconfirmations. The percentage of time that a second opinion does not confirm the first is called the nonconfirmation rate. The literature shows that about one-third of those who voluntarily seek second surgical opinions and about 18 percent of those required to obtain a second opinion are told that there is not a need for the proposed surgery (Ruchlin et al.,1982). Not all nonconfirmations imply that the surgery actually should not be performed,

but they can signal to a patient that ambiguity exists.

Nonconfirmation rates differ by procedure. Evaluations of the Cornell programs show that the highest nonconfirmation rates were for orthopedic surgeries (41.1 percent) and for gynecological surgeries (39.6 percent). The most common reasons cited for nonconfirmations were the absence of pathology and the failure to use medical therapy when indicated (Grafe, 1978). In the Massachusetts Medicaid program, the highest nonconfirmation rate was for laminectomies (19 percent) and the lowest rate for cholecystectomies (4 percent), likely due to the ease with which they can be diagnosed and the amount of medical consensus on these procedures (Poggio et al., 1985). The most common reason offered for the nonconfirming opinion was that further diagnostic studies should be undertaken (38 percent) and the second most common reason was that medical management should be attempted before surgery. Joffe (1980), in evaluating a voluntary SSOP, found that most frequently disputed initial recommendations for surgery were for orthopedic and urologic surgical procedures. The highest rates of disagreement were among urologists, and the lowest among general surgeons.

Factors affecting nonconfirmation rates have been explored in at least two major studies (Poggio et al., 1985 and Paris, 1979). Poggio et al. identified four factors that influence the congruence between first and second opinions:

- The patient's condition.

  Some patients will present with conditions in which surgery is clearly indicated, while others may present with conditions in

which surgery is either contra-indicated or the indications are unclear. Patients for whom surgery is clearly indicated should have higher confirmation rates than others.

- The extent to which the first and second physicians' medical training and surgical philosophies are similar.

  Surgeons with similar training and/or surgical philosophy should be more likely to resolve ambiguities in similar fashions, and have higher confirmation rates, than surgeons with dissimilar training or philosophies.

- The extent to which the first physician gains financially from performing the operation and the extent to which the physician allows this gain to influence his/her decision.

  Based on the report of a Gallup national survey in 1980, 71 percent of the American public feels that surgeons' financial incentives are a main factor contributing to unnecessary surgery. Surgeons who allow such incentives to influence their recommendations to patients may be less likely than others to have their recommendations for surgery confirmed by others.

- The extent to which the patient wants to avoid surgeries, and other attitudes the patient has about health care.

  If a patient does not want to have a surgery, he or she may

minimize the extent of discomfort when describing the condition to a consulting surgeon. If the indications for surgery are ambiguous, this may lead the consulting surgeon not to confirm the desirability of surgery.

Poggio et al. also found that: discussion between the first and second physicians significantly decreased the likelihood of nonconfirming opinions; the more recently the second physician had graduated from medical school, the more likely he/she was to confirm the first opinion; and the proposals of surgery for older patients were less likely to be confirmed than those for younger patients. They also pointed out the importance of examining the category of "no treatment necessary" cases often included in the nonconfirming category, because there are many cases in which neither surgery nor other treatment would improve the patient's condition.

Paris (1979) identified several additional factors that could influence nonconfirmation rates:

- Is the program mandatory or voluntary?

  Paris cited McCarthy and Kamon's (1976) finding of wide variations in nonconfirmation rates obtained by administratively identical programs, depending on whether consultation was made mandatory.

- How emphatic is the original recommendation for surgery?

  Twelve percent of the patients that met Paris et al.'s requirements for a second opinion had been mistaken in their

belief that surgery had actually been recommended by the original physician. Other patients received ambiguous initial recommendations, which was verified when a written statement about the recommendation had been received from the original physician.

- What is the specialty of the physician who made the initial recommendation for surgery?

  Paris et al. described a normal screening process, including rejections, that surgeons undertake for community physicians, but added that equating a nonconfirmation made by a surgeon following a first opinion by an internist with unnecessary surgery would be untenable.

Geographic Variation in Rates of Surgery. High rates of surgery for a specific procedure in one geographic area, when compared with substantially lower rates for the same procedure in another area, lead some to conclude that unnecessary surgeries are being performed in the area with higher rates. Such a perspective, however, is probably too simple.

Variations in the rates of surgical and medical procedures have been the subject of numerous studies in this country as well as in other medical systems. Bunker (1970), one of the first researchers to examine the question of variations in surgical procedures, concluded that indications for surgery are sufficiently imprecise to allow for a 100 percent variation in the rates of operations. Research subsequent to

Bunker's pioneering work indicates that assuming that a high elective surgery rate reflects a low standard of practice is much to simplistic a conclusion for this complex matter (Roos et al., 1977).

Rutkow (1979) pointed out that a high rate of surgery does not necessarily mean that too many procedures are being performed and a low rate may indicate that not enough surgery is being done. LoGerfo (1977) noted that, based on the work of Roos and others, we cannot place an implicitly positive value judgment on lower rates of surgical care for making policy decisions.

Board Certification of Physicians Participating in SSOPs. Board certification suggests that a physician has proceeded to the highest level of training possible. The guidelines developed by the American College of Surgeons for second opinion programs recommend that the second opinion should be rendered by a board certified specialist in the appropriate field of surgery (Lance and Haug, 1978).

The literature is sparse on this topic. McCarthy et al. (1977) detected no difference between the findings of board certified and noncertified physicians who provide the diagnostic or first opinion. Rutkow et al. (1979) conducted a randomized controlled trial of surgical specialists to determine agreement/disagreement patterns among surgical specialists for seven procedures frequently covered by SSOPs. Case studies were mailed to board certified specialists, and the results showed that opinions rendered differed to a major degree. These researchers found that physicians with more training relative to judgments under consideration agree more often than physicians with less training. Although this does not prove that the surgeons with more

training make better decisions, it is suggestive.

A.6 HISTORY OF CONGRESSIONAL INTEREST IN SSOPS

The development of the first voluntary and mandatory SSOPs in 1972 coincided with Congress's emerging interest in health care cost containment. The increased access to health care afforded by the Medicare and Medicaid programs had resulted in increased utilization and thus costs to both the federal and state payors for these programs. One provision of the 1972 amendments of the Medicare act was the establishment of Professional Services Review Organizations (PSROs), charged with reviewing the appropriateness and quality of inpatient care for Medicare patients. States such as Massachusetts turned to the PSRO organizations when they established their SSOP, using these organizations to provide desk audits or to arrange for a personal consultation on the necessity of the proposed elective surgery.

By 1974, early reports of the New York programs were circulating among decisionmakers (McCarthy and Widmer, 1974), generating special interest in Congress, which was considering ways to contain Medicare and Medicaid costs.

During 1976 and 1977, the U.S. House of Representatives' Subcommittee on Oversight and Investigations, known as the Moss Subcomittee, heard testimony regarding unnecessary surgery, SSOPs and the surgeon surplus.

In September 1977, HCFA awarded contracts to the Michigan and New York Blue Shield programs for 3-year demonstration projects to determine the feasibility of second opinions for the Medicare population.

HCFA issued guidelines to its regional offices for a national SSOP in May 1978 (Lance and Haug, 1978), and in September 1978, HCFA initiated the National Second Surgical Opinion Program (NSSOP). This program was an information and referral service that was a response to congressional concern about the appropriate use of surgical services. The NSSOP was implemented in two phases: the first phase was a widespread public information campaign to make consumers as well as providers aware of the potential for cost savings and reduced risks to patients who did not need to undergo surgery, and the second phase was to establish a series of referral centers where individuals could obtain the names of physicians willing to provide second opinions. Because Medicare beneficiaries were responsible for cost sharing, the question arose as to whether this additional cost to the patient inhibited him/her from seeking a second opinion. Under provisions of the 1980 Omnibus Budget Reconciliation Act legislation, the Department of Health and Human Services examined the desirability of waiving Medicare's cost-sharing requirements for second surgical opinions. The Department determined that waiving cost-sharing as an incentive for Medicare beneficiaries to voluntarily obtain second opinions did not appear to result in extensive use of the benefit (Friedlob, 1982).

In 1982 HCFA contracted with Abt Associates to provide a review of the relevant literature on SSOPs and to evaluate four specific programs. The Abt report concluded that only mandatory programs have potential for cost savings and among such programs, those without prescreening appear to be more effective than those using prescreening. The report noted that there is specific evidence that mandatory programs result in substantial cost savings for the Medicaid population. Further, there is

evidence that, on average, Medicaid SSOPs have virtually no direct effect on health outcomes, according to the report. However, it is the indirect effects that clearly account for the reduction in surgical rates, and there is no information regarding the indirect effects of such programs on the health of patients.

Noting the potential for sizable cost savings, the Inspector General (IG) of the Department of Health and Human Services in 1983 concluded that Medicare and Medicaid patients should be required to get a second opinion for surgery (Office of Inspector General, 1983). The IG's recommendation has not yet been fully implemented, and the Department of Health and Human Services as well as Congress are still studying the issue.

A second opinion program for Medicare patients was authorized by Congress in early 1986, and recommendations are being developed within HCFA about the feasibility of such a program.

Although a Federal requirement for SSOPs for State Medicaid agencies is temporarily precluded by the Omnibus Budget Reconciliation Act of 1986, P.L. 99-509, 12 State Medicaid agencies currently have mandatory programs, 7 States have voluntary programs, and an additional 10 States have considered or are considering the institution of such a program.

APPENDIX B

Survey on Current Programs

B.1 INTRODUCTION

In this appendix we present basic results from our survey of State Medicaid agencies. To determine which State Medicaid agencies have SSOP and/or inpatient hospital preadmission review programs and to identify the basic structure of these programs, a survey was sent to Medicaid agencies in all 50 States and the District of Columbia in October 1987. Forty-five agencies responded in full or in part to the multi-part survey. States from which we did not receive responses were: Indiana, Louisiana, Minnesota, Mississippi, New Mexico, and Ohio.

Program labels are used somewhat interchangeably among agencies, i.e., what one agency deems an SSOP may be designated as a preadmission review program by another agency. For purposes of this paper, we considered mandatory SSOPs as those in which agencies have specified a set of surgical procedures for which a second opinion must be obtained prior to the agency's payment for such a procedure.

The absence of mention of a State in the discussion of various program features indicates that the State did not report on that particular issue.

We first consider the SSOPs, concentrating on the mandatory programs, but report on those States with voluntary programs as well. Preadmission review programs are discussed in the second half of the appendix.

B.2 SECOND SURGICAL OPINION PROGRAMS

B.2.1 Current Medicaid SSOPs

Forty-five of the 51 Medicaid agencies responded to the survey on their SSOPs. Table B.1 classifies these States into the following categories: those with mandatory programs, those with voluntary programs, those that do not have and have never considered developing a program, those that have considered or are considering the development of such a program, those that have considered an SSOP and rejected it as a viable alternative, and those that have established some type of alternative program. We now address each of the three major categories of response: mandatory programs, voluntary programs, and no programs.

B.2.2 Mandatory Medicaid Programs

Twelve State Medicaid programs currently have mandatory SSOP programs: Colorado, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, Oregon, South Carolina, Tennessee, Virginia, Washington, and Wisconsin. We did not receive responses to this part of the questionnaire from Minnesota or Massachusetts. However, we were able to obtain some information on the Massachusetts program from previously published reports.

Connecticut had an SSOP program that covered 11 categories of procedures for the period October 1, 1982, through December 31, 1983, but allowed the program to terminate under a sunset provision when the Department of Income Maintenance could not determine that the program was

Table B.1

CLASSIFICATION OF MEDICAID SSOPS - 1987 SURVEY

		NO PROGRAM				
MANDATORY	VOLUNTARY	Never Considered	Have/Are Considering	Considered And Rejected	Have Alternate Program	UNKNOWN
Colorado	Alabama	Georgia	Arkansas	Connecticut	California	Alaska++
Massachusetts*	Arizona	Iowa	Maryland	Nebraska	Delaware	Idaho
Michigan	District of Columbia	Kentucky	Montana	New Hampshire	Florida	
Minnesota*+	Hawaii	Louisiana	Nevada	New York	Indiana	Maine+
Missouri	Illinois	Oklahoma	North Carolina	Rhode Island		Mississippi
New Jersey	Kansas	South Dakota	Texas			New Mexico+
Oregon	North Dakota		Utah			Ohio
South Carolina	Pennsylvania		Vermont			
Tennessee			Wyoming			
Virginia			West Virginia			
Washington						
Wisconsin						
12	N=8	N=6	N=10	N=5	N=4	N=6

* No survey response
\+ Known to be working on
++ Survey with blank response

having any positive effect. New York established a mandatory program in 1976, but following a 1977 court ruling that the law violated the Social Security Administrations' requirement for providing surgical services to an eligible person when an operation is medically indicated, the State dropped the program in July 1978. Table B.2 provides information on the dates these mandatory programs were instituted, the number of procedures they cover, their participation and nonconfirmation rates, whether board certification is required of physician consultants, the savings attributed to these programs and whether and by whom the programs have been evaluated.

Starting Dates of Mandatory SSOPs. Of the 12 mandatory SSOPs, Massachusetts has been the longest in continuous operation, instituting their program in 1976. The newest program is that of South Carolina, which was instituted in December 1986. Data on this program are limited, given its recent implementation date.

Procedures Covered. States used some or all of the following processes to determine which procedures should be covered by an SSOP:

- o review of procedures covered by other Medicaid agencies;
- o review of procedures covered by non-Medicaid SSOPs;
- o review of the literature;
- o identification by medical consultants of procedures subject to overutilization and abuse;
- o identification by medical consultants of procedures subject to wide variation of opinion as to their appropriateness; and
- o review of high volume and/or high cost procedures.

Table B.2

COMPARATIVE FEATURES - MANDATORY MEDICAID PROGRAMS

STATE	Date Instituted	No Procedures Covered	Participation Rate	Require Board Certification	Nonconfirmation Rate	Savings Attributed to SSOP	Evaluated
CO	9/85	19				Do not calculate	
MA*							
MI*	1979	17			Do collect data	Do not calculate	By Agency
MN*							
MO	10/81	13	Do collect data	Not available	Do not have data	Do not calculate	By agency - No results noted
NJ	4/82	7	Do collect data	See Table 5		Do not calculate	By agency - program to new to draw conclusions
OR	7/84	PRO Determines	No response	Use any board certified MD	No response	$394,982 for 7/86-6/87	Ongoing agency monitoring indicates
SC	12/86	3				Do not deduct program cost	Savings exceed costs
TN	10/84	4	Do not collect	Board certification not required	Do not collect	Not available	Have not evaluated
VA	7/84	10	Based on claims		Claims data (denials) only	$961,521 for 1986 Do not deduct program costs	See note, below
WA	1/82	4	Do collect data	Not available	Do not collect	$656,000 for 1/82-1/83 Do not deduct program costs	See note, below
WI	2/81	9	Do collect data	See Table 5	Do collect data	Do not calculate	By Wisconsin Dept. Health and Social

*Survey Response Not Received

NOTE: Evaluation of Medicaid SSOPs: Virginia - Although the number of procedures performed has decreased, the spending has not decreased in proportion because the rates have increased.

Washington - Agency has evaluated and will evaluate again in 1988. Evaluation recommended to continue with current program. Are considering dropping choiecystectomies and adding other procedures.

The number of procedures (or procedure categories) mandatorily covered ranges from 19 in Colorado to 3 in South Carolina. Table B.3 shows the procedures (or procedure categories) covered by each reporting state.

The average number of procedures covered among the 10 States for which we could obtain information is 9 (9.3), and the median is 8. All 10 of the States for which we could obtain information cover hysterectomies. Nine States cover cholecystectomy (although Washington is considering dropping this coverage) and tonsillectomies/adenoidectomies. Seven States cover hernia repairs and six cover hemorrhoidectomy (although Colorado, which had once covered this procedure, has since dropped it). Cataract extraction, dilation and curettage, and laminectomy/laminotomy are covered by four States. Three States cover joint replacement (hip or knee) and spinal fusion procedures. Two States cover arthrotomy, coronary artery bypass grafts, meniscectomy, myringotomy, submucos resection of nasal septum, tympanostomy, and excision of varicose veins. The remaining 21 procedures are covered by only one of the reporting States.

The number of procedures covered has changed in five of the 12 States with mandatory programs. Three States--Colorado, Michigan, and Missouri--have added to their initial lists of procedures requiring a second opinion. Colorado and Michigan have also dropped certain procedures from mandatory review, as have Oregon and Wisconsin. Table B.4 shows the changes in procedures added and dropped by the reporting states. Two procedures--bunionectomy and meniscectomy--have been added by some programs and dropped by others.

Table B.3

PROCEDURES COVERED BY MANDATORY MEDICAID PROGRAMS

	CO	MA	MI	MN	MO	NJ	OR	SC	TN	VA	WA	WI	TOTALS
Arthroscopy	X												1
Arthrotomy	X		X										2
Breast Surgery (except biopsy)	X												1
Bunionectomy					X								1
Cataract Extraction	X		X		X							X	4
Cesarean Section, Elective										X			1
Cholecystectomy	X		X		X	X		X	X	X	X	X	9
Colporrhapy, Anterior & Posterior					X								1
Coronary Angiography	X												1
Coronary Angioplasty	X												1
Cordnary Artery Bypass Graft	X									X			2
Dilation and Curettage			X		X					X		X	4
Disk Surgery					X								1
Ethmoidectomy			X										1
Gastroplasty	X												1
Hemorrhoidectomy			X		X				X			X	4
Hernia Repair			X		X	X		X	X		X	X	7
Hysterectomy	X		X		X	X		X	X	X	X	X	9
Joint Replacement (hip or knee)	X									X		X	3
Knee Surgery	X												1

Table B.3

CONTINUED
PROCEDURES COVERED BY MANDATORY MEDICAID PROGRAMS

	CO	MA	MI	MN	MO	NJ	OR	SC	TN	VA	WA	WI	TOTALS
Laminectomy/Laminotomy					X	X				X			3
Lumbar Laminectomy & Dissectomy	X												1
Maxillectomy			X										1
Meniscectomy			X										1
Myelogram	X												1
Myringotomy			X		X								2
Oophorectomy	X												1
Osteotomy					X								1
Pacemaker	X												1
Sinusotomy			X										1
Spinal Fusion	X		X			X							3
Submucos Resection Nasal Septum			X										1
Surgeries of the Feet			X										1
Surgical Intervention for Thoracic Outlet Syndrome	X												1
Tonsillectomy/ Adenoidectomy	X		X		X	X			X	X	X	X	8
Transurethral Resection										X			1
Tympanostomy			X		X								2
Varicose Veins, Excision of												X	1
N=38 Procedures													
Total No. Procdeures	19		17		13	7			4	10	4	9	85

Table B.4

CHANGES IN SSOP COVERAGE OF SELECT PRODCEDURES
1979-1987

Procedure	Added CO	Added MI	Added MO	Dropped CO	Dropped MI	Dropped WI
arthrotomy/synovectomy		X				
breast surgery	X					
bunionectomy			X	X		
cataract removal		X				
cervical disectomy	X					
colporrhaphy			X			
endarterectomy				X		
ethmoidectomy		X				
hemorrhoidectomy				X		
inguinal hernia					X	X
knee surgery	X					
lumbar disectomy	X					
meniscectomy		X		X		
myelogram	X					
myringotomy		X	X			
osteotomy			X			
sinusotomy		X				
spinal/spinal cord	X	X				
submucous resection nasal septum		X				
surgeries of the feet		X				
transurethral resection, prostate						X
tympanoplasty		X	X			
arthrotomy/synovectomy		X				
breast surgery	X					
bunionectomy			X	X		
cataract removal		X				
cervical disectomy	X					
colporrhaphy			X			
endarterectomy				X		
ethmoidectomy		X				
hemorrhoidectomy				X		
inguinal hernia					X	X
knee surgery	X					
lumbar disectomy	X					
meniscectomy		X		X		
myelogram	X					
myringotomy		X	X			
osteotomy			X			
sinusotomy		X				
spinal/spinal cord	X	X				
submucous resection nasal septum		X				
surgeries of the feet		X				
transurethral resection, prostate						X
tympanoplasty		X	X			

Procedures Required on an Outpatient Basis. Four States--Colorado, Michigan, Missouri and Virginia--require certain procedures to be done on an outpatient basis. The processes used by States to determine which procedures should be done on an outpatient basis include:

- o review of procedures that other State Medicaid programs restrict to an outpatient basis;
- o review of procedures that other non-Medicaid programs such as Blue Cross and/or Blue Shield restrict to an outpatient basis; and
- o input from medical consultants on which procedures could be restricted to an outpatient basis.

Colorado lists 14 procedure categories that must be done on a outpatient basis and Virginia lists 95 procedures that must be done on an outpatient basis. The Oregon program has a suggested list of procedures that could be done on an outpatient basis, but the Peer Review Organization (PRO) may authorize any procedure to be done on an inpatient basis if they determine it is medically necessary. The remaining reporting States--New Jersey, Tennessee, Washington, and Wisconsin--do not require certain procedures to be performed on an outpatient basis.

Participation Rates. Mandatory Medicaid SSOPs require that all Medicaid patients who are recommended for elective surgery for certain predetermined procedures obtain a second opinion before proceeding with the surgery. On that basis, one might assume that the participation rate of Medicaid patients would be 100 percent. There are exceptions to required participation, however. Some programs have waiver provisions to exempt patients who are in pain or at risk, or for whom obtaining a second opinion would be a hardship or who live too far from a consulting physician, for example. The participation rate indicates

what proportion of the Medicaid population recommended for surgery obtains a second opinion.

Six States (Colorado, Michigan, Missouri, New Jersey, Washington and Wisconsin) stated that they maintain information on their participation rates, either through the Medicaid agency or through the PRO with which the Medicaid agency contracts for services. Virginia has information on the claims paid, but does not calculate program participation rates. Tennessee does not collect these data.

Requirements for Consultant Specialization. States vary in the requirements they have for participating consultants who offer second opinions. Michigan and Oregon require that the consultant who offers a second opinion be a surgeon of the same speciality or subspecialty as was the diagnosing physician. Surgeons and nonsurgeons in the same field may offer second opinions in New Jersey. Tennessee permits any surgeon to offer a second opinion. In Virginia, Missouri, Washington, and Wisconsin, any physician, including a nonsurgeon, may render a second opinion.

Board Certified Status of Consulting Physicians. Board certification may be required of the diagnosing and/or the consulting physician. The requirement for board certification varies by State. Some States may require that both the diagnosing and the consulting physician be board certified. Michigan, New Jersey, and Oregon require all consulting physicians to be board certified (Michigan notes that consultants may be board eligible). Board certification is not required in Tennessee. Neither Missouri nor Washington had information available on board certification.

Table B.5 shows the number of board certified consultants who provide second surgical opinions for New Jersey and Wisconsin, the two States that reported these data. Michigan uses a panel of 450 board certified physicians to render second opinions.

Nonconfirmation Rates. If the second opinion obtained does not agree with the opinion of the diagnosing physician who has recommended surgery, the second opinion is a nonconfirming opinion. Michigan, New Jersey, and Wisconsin maintain data on the nonconfirmation rates of second opinions rendered. Virginia has information on the number of claims denied because it did not meet the second opinion criteria, but they do not calculate nonconfirmation rates.

Payment Policies for Nonconfirmed Surgeries. Seven States--Michigan, Missouri, New Jersey, Tennessee, Virginia, Washington, and Wisconsin--will pay for the patient's surgery even if the second opinion does not confirm the first. Colorado and Oregon require that the PRO review cases of nonconfirmation and make case-by-case decisions. Both Missouri and Oregon permit a patient to seek a third opinion if he/she wishes.

Medicaid Payment Rates for Second Opinions. Medicaid payment rates to consulting physicians for rendering second opinions vary in some programs according to the complexity of the assessment. The rates for the most comprehensive type of assessment range from $28 (Missouri) to $59.48 (Michigan). The average payment rate for the six programs that provided rate data is $44.36.

Table B.5

BOARD CERTIFIED PHYSICIANS WHO PROVIDE SECOND SURGICAL OPINIONS

Type of Physician	Number Board Certified Who Provide Second Surgical Opinions	
	NJ	WISC
General surgeon	280	302
Neurosurgeon	10	0
Ophthalmic surgeon	0	234
Orthopedic surgeon	36	150
Ear, Nose, Throat	100	93
Eye, Ear, Nose, Throat	0	4
Other physician		
Family Practice	0	125
Gastroenterologist	20	0
General Practice	0	125
Internal Medicine	105	111
Neurologist	15	0
OB-GYN	195	258
Pediatrics	90	65
Other	0	51
N=	851	1,518
	3,566	1,683

* self-reported surgical specialist

NOTE: These numbers are from the 1986 Physician Characteristics: Distribution in the U.S. These figures represent the number of surgeons of all types in the office based practice and full time physician staff in hospital based practice.

Savings Attributed to Mandatory SSOPs. Only three of the reporting States--Oregon, Virginia, and Washington--calculate the savings they believe accrue to their program as a result of having an operational SSOP. These states reported on their savings as follows:

OREGON: For the period July 1, 1986, to June 30, 1987, savings totalled $394,982.

VIRGINIA: For the 1986 calendar year, savings totalled $961,521.

WASHINGTON: For the period January 1, 1982, through December 31, 1982, savings totalled $656,000.

All three States indicated that these figures do not account for the costs of administering the program or any costs to patients or providers for participating in the program. Neither do these figures account for the costs of alternative surgeries a patient may have, for the costs of alternative medical care, or for the downstream medical and surgical costs that may accrue when a surgery is merely deferred or another intervention is necessary to improve the patient's status for the particular condition in question.

Evaluation of Mandatory SSOPs. All but one State (Tennessee) reported that some type of evaluation of their programs had been done or is done on a regular basis. Virginia reported that although the number of procedures has decreased since the implementation of their SSOP, the spending has not decreased in proportion because the rates have increased. Washington had previously evaluated its program, which resulted in a recommendation to maintain the current program. They have considered dropping the cholecystectomy procedure from their list of required procedures, and they are considering adding other (unspecified) procedures. Washington will be undertaking another evaluation of their program. Wisconsin's program has been

evaluated at several intervals, the first of which was to determine whether the program should be retained. The legislature decided to retain the program, based on preliminary evaluation reports by the Department of Health and Social Services that covered the first 8 months of operation. Although Massachusetts did not respond to the survey, evaluations of this program are in the published literature (Gertman et al, 1980; Martin, 1982; Martin et al, 1982; Poggio et al, 1985). Appendix A discusses evaluations of SSOPs in greater detail.

B.2.3 Voluntary Medicaid SSOPS

Seven States--Alabama, Arizona, Hawaii, Illinois, Kansas, North Dakota, and Pennsylvania--as well as the District of Columbia have voluntary SSOPs. The District of Columbia has always offered Medicaid patients the option of a second opinion. Three of these States--Alabama, Arizona, and Pennsylvania--have considered establishing a mandatory program or currently have parts of their programs that are mandatory in nature. Alabama, in fact, is currently evaluating the cost effectiveness of instituting a mandatory program for the State. Table B.6 provides information on the starting dates, procedures covered, and whether these programs have been evaluated.

B.2.4 Medicaid Agencies That Do Not Have an SSOP.

Twenty-one of the 45 Medicaid agencies that responded to the survey indicated that they do not now have an SSOP. Six States have never considered implementing such a program, 10 States have considered or are considering an SSOP, five States have considered and rejected an SSOP, and three States have alternative programs (see Table B.1).

Table B.6

COMPARATIVE FEATURES - VOLUNTARY MEDICAID SSOPS

State	Date Instituted	No Procedures Covered	Mandatory Program Considered?	Evaluated By/Date
AL	5/87	All surgical	Yes	In 11/87 agency will initiate c/e study for certain procedures to be mandatory
AZ	10/82*		Yes - for 3 health plans	
DC	Since Medicaid Began	All surgical	?	
HI	1980	All surgical	?	
IL	1/79	All surgical	?	Attached cost data to survey response. SO surgeries only identifiable if MD chooses to indicate on invoice that services were result of known SO
KS	?		?	
ND	10/77	All surgical	?	
PA	2/88	19 mandatory, voluntary for all surgical	Proposed program has mandatory component	Program has not yet been implemented

* Have 6 separate programs, one for each health plan.

B.3 INPATIENT HOSPITAL PREADMISSION REVIEW

Many Medicaid agencies have chosen to use an inpatient hospital preadmission review program in lieu of an SSOP or to complement an SSOP to control utilization and costs. Twenty-seven of the 45 States that responded to the survey indicated that they have an inpatient preadmission review program. Table B.7 lists the State Medicaid agencies that have established preadmission review programs and the dates on which those programs were instituted. Six States that have mandatory SSOPs--Colorado, Michigan, Oregon, Tennessee, Washington, and Wisconsin--also have inpatient hospital preadmission review programs.

B.3.1 States with Medicaid Preadmission Review Programs

Authorizing Body. In 56 percent of the States that responded (15 of 27), the organization that authorizes hospital admissions is the PRO. The Medicaid agency is the authorizing agency for 41 percent (11 agencies) of the agencies. One agency (Indiana) uses its fiscal intermediary, Blue Cross and Blue Shield, as the authorizing body for its preadmission review program.

Procedures, Services and Treatments Covered by Review Program. Forty-one percent of the survey respondents cover all elective admissions, exempting, in some cases, certain procedures such as emergency admission (see below). Programs that do not exempt emergency admissions may require that they be certified within a 24-hour period if the hospital wants to be reimbursed for the admission. California and Florida specify a number of procedure codes that

Table B.7

STATES THAT HAVE MEDICAID INPATIENT HOSPITAL PREADMISSION REVIEW PROGRAMS

State	Date Instituted
Alabama	October 1986
Alaska	Not reported
Arizona	1983-87 (for 7 different plans)
California	1970
Colorado	September 1985
Delaware	October 1984
Florida	September 1985
Hawaii	October 1985
Indiana	March 1986
Kentucky	September 1983
Maryland	July 1981
Michigan	October 1984
Montana	March 1985
Nevada	March 1977
North Carolina	November 1986
North Dakota	June 1985
Oregon	July 1983
Pennsylvania	February 1988
Rhode Island	March 1982
South Carolina	January 1986
Tennessee	November 1986
Utah	August 1987

are included in their review programs. Table B.8 lists a more limited number of procedure codes that are covered by the preadmission review programs in Alaska, Colorado, Vermont, and West Virginia.

The Utah Medicaid program requires prior authorization for physician inpatient hospital psychiatric services and for inpatient hospital psychiatric admissions.

Types of Admissions Excluded from Review. Seventy-four percent of the Medicaid preadmission review programs (20 programs) exclude emergency admissions from preadmission review, and 30 percent (8 programs) exclude same day surgeries from preadmission review.

In addition, programs may exclude other types of admissions from preadmission review. Eight programs (30 percent of respondents) exclude labor and delivery-related admissions from review, and five programs (19 percent) exclude psychiatric admissions from review. Other types of admissions, each excluded by three programs are drug and substance abuse admissions and rehabilitation hospitalization admissions. Table B.9 indicates types of admissions excluded by specific programs.

Reimbursement Policies. Fifty-two percent (14 agencies) of the programs reimburse a hospital if a patient is admitted without approval having been granted in advance.

Agency Monitoring of Trend Data. Agencies vary by the type and extent of monitoring they do for their preadmission review programs. Seventy percent (19 programs) track the number of times preadmission review was sought, and 67 percent (18 agencies) track the number of times approval for admission was

Table B.8

PROCEDURE CODES COVERED BY FOUR STATE PREADMISSION REVIEW PROGRAMS

Procedure	State			
	AK	CO	VT	WV
abdominal surgery			X	
antireflex	X			
arthroscopy	X	X		
arthrotomy*		X		
behavior disorder		X		
breast surgery		X		X
bunionectomy*	X			
carpal tunnel release		X		
cataract extraction*	X	X	X	
carotid endarterectomy	X			
cesarean section, elective only*	X			
chronic pain control		X		
cholecystectomy*	X		X	
coronary bypass*	X			
deviated septum septoplasty	X			
dilation and curettage*	X			
eating disorder		X		
endoscopy		X		
foot surgery		X		
hemorrhoidectomy*		X		X
hernia repair*			X	X
hysterectomy*	X		X	X
inguinal herniorrhaphy		X		
laminectomy*	X			
ligation and stripping of saphenous veins*	X		X	
mastectomy	X			
meniscectomy, knee*	X			
nasal surgery		X		X
prostatectomy, TURP	X		X	
sterilization		X		
substance abuse		X		
tonsillectomy and adenoidectomy*	X			
total hip replacement	X			

*Indicates this procedure is also covered by some SSOPs.

Table B.9

PROCEDURES EXCLUDED FROM INPATIENT HOSPITAL
PREADMISSION REVIEW PROGRAMS

	AZ	CO	DE	HI	IN	KY	MD	MI	MT	NC	ND	OR	PA	SC	TN	UT	WY	Totals
C-Section, Scheduled			X															1
Drug & Substance Abuse			X								X		X					3
Labor/Delivery					X	X			X	X	X			X	X		X	8
Medicare Covered pts.										X					X			2
Newborn Care, routine			X															1
Psychiatric			X								X		X		X	X		5
Rehabilitation				X							X		X					3
Retroactive MCD Eligibility							X								X			2
Totals	0	0	4	1	1	1	1	0	1	2	4	0	3	1	4	1	1	25

denied. Only 44 percent (12 agencies) of the programs track the number of admissions for which no preadmission review had been sought. A slightly higher proportion of agencies, 48 percent (13 agencies), track the number of times approval was initially denied and the patient was later admitted with approval.

Cost Savings Attributed to Preadmission Review Program. Only eight States (30 percent) calculate savings they attribute to their inpatient hospital preadmission review programs. Only four States -- Indiana, Michigan, Nevada, and Oregon -- reported their savings for a recent 12-month period, as follows:

Indiana — $26,596,988 for period October 1986 through October 1987. Savings are calculated by multiplying a 1983 average hospital cost per day of $325 by the number of days of reduced utilization.

Michigan — $2,719,574 for the period October 1, 1986, through September 30, 1987. Savings are determined from a 20 percent review to validate urgent and emergency care cases. The cost savings from the number of cases being denied (minus the reversals) are added to the physician gross adjustments and the claim adjustments for noncompliance with program policy. The total cost savings does not include savings from deterence of the sentinel effect.

Nevada — $3,000,000 for the period January 1, 1986, through December 31, 1986.

Oregon — $460,000 for the period July 1986 through June 1987.

None of the four reporting agencies deducted the cost of administering the program from the calculated savings. All four States included savings of hospital costs, and Michigan included the savings of physician costs as well.

Only Oregon among these four States does not reimburse for denials for inpatient services. Indiana alone deducted the costs of outpatient services offered in lieu of inpatient services in calculating their cost savings.

Evaluation of Preadmission Review Programs. One-third of the agencies (9 programs) stated that they have evaluated their preadmission review programs. Two States, Indiana and Montana, indicate that their average length of stay has dropped as a result of their evaluation efforts. The Florida program is currently in the process of determining which procedures/diagnoses with high denial rates are most frequently denied and whether these denial rates suggest that such procedures should be subject to preadmission certification.

B.3.2 States That Do Not Have Medicaid Preadmission Review Programs

Table B.10 provides information on the 13 States that reported they do not have an inpatient hospital preadmission review program. Four States have never considered a program, four have considered or are considering such a program, four States have considered a preadmission review program and have rejected this option and/or adopted another utilization review alternative, and the status of 10 States is unknown.

Table B.10

STATES THAT DO NOT HAVE MEDICAID INPATIENT HOSPITAL PREADMISSION REVIEW PROGRAMS

Have Never Considered	Have/Are Considering	Have Considered and Rejected or Replaced	Unknown
DC	Arkansas	Iowa	
Georgia	Connecticut	Kansas	
Missouri	Illinois	New Hampshire	
New Jersey	Nebraska	Oaklahoma	Idaho
Texas			Louisiana
Virginia			Maine
			Massachusetts
			Minnesota
			Mississippi
			New Mexico
			New York
			Ohio
			South Dakota*
N = 6	N = 4	N = 4	N = 10

APPENDIX C

Technical Appendix on Use of Claims Data

C.1 DATA SOURCES

The mandate calls for information on high volume and high cost procedures in the Medicaid population for a sample of States and for the rates at which such procedures are performed on patients of comparable age who are not Medicaid patients. Our data for the Medicaid population came from the Tape-to-Tape Project, and our data for the non-Medicaid comparison group came from the NHDS. We discuss each data source below.

C.1.1 The Tape-to-Tape Project

As noted in Section 2, HCFA sponsors an ongoing data project, called the Tape-to-Tape Project, that collects detailed Medicaid information for a sample of States -- California, Georgia, Michigan, New York, and Tennessee. The data base contains information on all Medicaid claims, enrollees, and providers in the sample States. The claims files provided the basic data for our analysis.

The project currently has claims data for the years 1980-1984 (except for New York, see below). For our analysis of high volume and high payment procedures, we used only the most recent data (i.e., data for 1984).

As noted previously, we could not use the data from all of the States. The California data could not be used because no procedure codes are available in the claims files, and therefore we could not obtain volume or payment information for separate procedures. New York dropped out of the Tape-to-Tape Project in 1982, so we had no data for this State

in 1984. In addition, the data we have in 1982 for New York are only partial in that we do not have Medicaid claims for October through December of 1982 and not all counties are included (Erie and Suffolk counties are missing). We therefore did not include New York in our analyses. The States included in our basic analysis sample thus were Georgia, Michigan, and Tennessee.

In generating our analysis files, we restricted the data base for our sample States in a number of ways. First, certain types of claims were not relevant to the focus of the analysis and were excluded. The Tape-to-Tape Project contains claims for inpatient care, outpatient care, long-term care and home health, dental care, and prescription drugs. Table C.1 presents the number of claims of each type. Note that each inpatient claim represents one "stay," combining bills for the same admission to the hospital. Likewise, each claim for long-term care represents one separate bill, typically the combined payments for one month of services to an individual recipient. Outpatient, drug, and dental claims each represent one unique service. For example, there are separate outpatient claims for each separate physician visit, lab test, and the like. For the purposes of this study, inpatient and outpatient hospital claims are most relevant and were selected for the analysis. Other claim types were excluded.

In addition, the Tape-to-Tape claims files contain all claims paid by Medicaid in the State. This includes claims paid for persons enrolled in both Medicare and Medicaid. We removed claims for this crossover population from the data base for the following reasons: (1) Medicare is the first payor for persons enrolled in both Medicare and Medicaid and, therefore, the Medicaid payment amounts on these claims primarily

Table C.1
Number of Claims in Tape-to-Tape States

Type of Claim	State		
	Georgia	Michigan	Tennessee
Inpatient 1/	123,743	187,742	140,948
Outpatient	5,342,074	14,741,364	4,494,270
Long-term care and home health 2/	389,595	469,529	371,195
Dental care	446,071	1,358,728	380,065
Perscription drugs	5,993,427	9,011,497	4,521,532
Total	12,294,910	25,768,860	9,908,010

1/ An inpatient claim represents one "stay", combining bills for the same admission to the hospital.

2/ A long-term care claim represents one separate bill, typically the combined payments for one month of service to an individual recipient.

represent only coinsurance and deductible payments; (2) Medicare beneficiaries may not be obligated to follow the second opinion regulations established by Medicaid; and (3) in Georgia and Tennessee the claims for the crossover population do not include detail information (e.g., procedure performed), so we could not break down volume and payment by procedure as called for in the mandate.

Finally, inpatient and outpatient hospital claims can be categorized into claims associated with medical treatments and claims associated with procedures. The focus of the mandate is on obtaining information on procedures, especially in relation to SSOPs (see paragraphs 1A. through 1D. and paragraph 2. of the mandate). Thus only inpatient and outpatient claims associated with procedures were selected. In our sample States, procedures are coded using either the ICD-9-CM or CPT-4 coding systems (see below). Surgical procedures were defined to be ICD-9-CM codes in the range 01.0 through 86.99 or CPT-4 codes in the range 10000 to 69999.

Table C.2 summarizes our selection of inpatient claims. Of the 123,743 inpatient stays in Georgia, 25,631 were usable stays for surgical procedures for the noncrossover population. In Michigan, 46,718 of the 187,742 inpatient stays were appropriate for our analysis, and, in Tennessee, 23,527 of the 140,948 total inpatient stays were selected.

Table C.3 summarizes our selection of outpatient claims for the outpatient analysis. Recall that there is an outpatient claim for each unique service performed. We used episodes of care as our unit of analysis (see below), so we needed to select and group outpatient claims into episodes. To accomplish this, our outpatient files were broken into two groups: outpatient claims linked to inpatient stays to generate

Table C.2
Selection of Inpatient Stays

Type of Stay	State		
	Georgia	Michigan	Tennessee
All inpatient stays	123,743	187,742	140,948
Inpatient stays for crossovers (excluded)	41,975	26,955	78,476
Inpatient stays with technical problems (excluded)	9,350	1,260	3,094
Inpatient stays for medical treatments (excluded)	46,787	112,809	35,851
Inpatient stays for surgical procedures	25,631	46,718	23,527

Table C.3
Selection of Claims for Outpatient Analysis

Type of Claim	State		
	Georgia	Michigan	Tennessee
All outpatient claims	5,342,074	14,741,364	4,494,270
Outpatient claims for crossovers (excluded)	1,596,440	1,374,726	1,239,323
Outpatient claims linked to inpatient stays (excluded)	307,148	795,232	305,061
Outpatient claims with technical problems (excluded)	112,116	194,661	165,585
Outpatient claims linked to outpatient episodes for medical treatment (excluded)	3,219,460	11,483,818	2,722,646
Outpatient claims used in creation of outpatient episodes for surgical procedures	106,910	892,927	61,655
Outpatient episodes for surgical procedures	30,029	267,645	20,201

inpatient episodes of care (see below for details), and outpatient claims used in the creation of outpatient episodes. In Georgia, 106,910 of the 5,342,074 outpatient claims were appropriate for use in generating outpatient surgical episodes, and 30,029 outpatient surgical episodes were generated. In Michigan, 892,927 of the 14,741,364 total outpatient claims were selected and 267,645 outpatient surgical episodes were generated, while in Tennessee, 61,655 of the 4,494,270 outpatient claims were selected and 20,201 surgical episodes were created.

In summary, the data base we used in our analysis consists of all inpatient and outpatient claims associated with episodes in which a surgical procedure was performed and paid by Medicaid for the noncrossover population in Georgia, Michigan, and Tennessee in 1984.

C.1.2 NHDS

The data source for the comparison group called for by the mandate is the NHDS, conducted annually by NCHS. The NHDS contains information on hospital discharges for nearly 200,000 patients who received care in U.S. short-stay hospitals. The data obtained from the survey include demographic information on the patient (e.g., age and sex) as well as information on procedures performed during the hospital stay. The NHDS does not contain data on procedures performed on an outpatient basis.

Recall that we excluded information from the Tape-to-Tape data base for persons enrolled in both Medicare and Medicaid. To make the data sets comparable, we excluded information for persons age 65 and over from the

NHDS data. The disabled can also be enrolled in both Medicare and Medicaid, but we were not able to identify discharges for such persons in the NHDS.

The mandate states that we should compute rates at which each high cost and high volume procedure is performed on patients who are not covered by Medicaid. Unfortunately, for technical reasons, we were not able to compute rates of performance for a strictly non-Medicaid population. To compute this rate, we would need to have information on the number of hospital stays for each procedure not paid by Medicaid for the numerator of the rate. For the denominator of the rate, we would need the total number of persons in the United States who were not Medicaid enrollees. We could obtain information for the numerator from the NHDS, but we could not obtain a corresponding count for the denominator of the rate. The comparison data thus are comprised of information from the NHDS for all patients under age 65. The numerator of the rates is the number of hospital stays in which each procedure was the primary procedure performed for all patients under age 65, and the denominator is the size of the U.S. population under age 65 obtained from the U.S. Census Bureau. Note that the comparison data thus contain information on Medicaid patients. It is notable, however, that only 10 percent of all stays for patients under age 65 are for Medicaid recipients.

C.2 UNIT OF ANALYSIS

As noted in Section 2, claims data can be organized in a number of ways to study the volume and payments for procedures. One approach is to combine services associated with a procedure to define an episode of

care. Under this approach, all lab, x-ray, facility charges, physician fees, and the like associated with a procedure would be combined to form an episode of care. This approach gives a comprehensive view of the payments for a procedure, so we adopted the episode of care as our unit of analysis.

Inpatient episodes were created as follows. In the inpatient claims file, each record represents one stay, combining all bills for the same admission to the hospital. Note, however, that these inpatient stay records do not include claims for physician fees or services performed by providers other than the inpatient hospital itself (e.g., lab or x-ray). Such claims are included in the Tape-to-Tape outpatient files. To create inpatient episodes we wanted to include payments for such services with the inpatient stay record. To accomplish this, we proceeded as follows. We attempted to link outpatient claims to inpatient stay records using recipient identification number and date of service as the matching variables. If the recipient ID's matched and the date of service on the outpatient claim fell within the admission and discharge dates on the inpatient stay record, then the payment amount on the outpatient claim was added to the payment amount on the inpatient record.

Table C.4 documents this linkage of outpatient claims and inpatient stays for our sample States. The number of outpatient claims linked to an inpatient stay was 307,148 in Georgia, 795,232 in Michigan, and 305,061 in Tennessee. Note also that most inpatient stays were linked with at least one outpatient claim. In Georgia, 59,255 of the 72,812 total inpatient stays for medical treatments or surgical procedures were linked with outpatient claims (81 percent), and 89 percent were linked in Michigan and Tennessee. In summary, our inpatient episodes were composed of

Table C.4
Linking Outpatient Claims to Inpatient Stays

Type of Claim	State		
	Georgia	Michigan	Tennessee
Outpatient Claims:			
Total noncrossover outpatient claims	3,745,634	13,366,638	3,254,947
Outpatient claims linked to inpatient stay	307,148	795,232	305,061
Inpatient Stays:			
Total noncrossover inpatient stays (for medical treatments or surgical procedures)	72,412	159,527	59,378
Inpatient stays with linked outpatient claims	59,255	142,288	52,851

information on the inpatient stay record and also included payments for outpatient services that occurred during the hospital stay.

Outpatient episodes were created by first selecting all outpatient claims that were not linked to an inpatient stay. Episodes were then formed by combining all claims for a given recipient on a given day. Clearly, a number of different kinds of claims may go into an episode (physician fee, lab, etc.). Claims for physician fees contain a code for the procedure performed. The procedure performed during the episode was thus defined to be the procedure code from the physician claim for the episode. If more than one physician claim was present, the code for the claim with the largest dollar amount was chosen. The amount paid for the episode was the sum of payments for all claims going into the episode.

Ideally one would want to include all services associated with a procedure in defining the episode of care for a given case. Unfortunately this is very difficult to do in practice. For example, the true length of time needed to define an episode is unknown. How far back in time should one go in including claims for office visits prior to the performance of a procedure, and how does one know which visits relate to the procedure. Because of such difficulties, this study adopted the more limited approach described above. For procedures performed on an inpatient basis, all services provided during the inpatient stay (i.e., all services delivered between the admission and discharge dates) are assumed to define the episode of care. For procedures performed on an outpatient basis, all services provided on the day the procedure was performed are assumed to define the episode of care. In this regard, payments for episodes may be understated since some pre- and post-surgical payments may not be included.

C.3 MEASUREMENT

The mandate calls for information on three basic outcome variables (payment rate, aggregate payment, and rate of performance) for procedures performed on the Medicaid population. It also requested information on the number of physicians who perform the procedures. Below we describe how these variables were measured.

C.3.1 Procedures

On our analysis files, a primary procedure is identified for each episode of care. These procedures are coded using either the ICD-9-CM or CPT-4 coding systems. These coding systems are very detailed. For example, the CPT-4 system has 10 individual codes under the general procedure of Caesarean section. In defining procedures for consideration in SSOPs, individual ICD-9-CM and CPT-4 codes are too specific, so we grouped individual codes to form more general procedure categories. We discuss how we grouped the codes to define procedure categories next.

For clarity of presentation, we define a procedure code to refer to an individual ICD-9-CM or CPT-4 code, and a procedure category to refer to a group of codes pertaining to a common general procedure.

Georgia and Michigan code inpatient procedures using the ICD-9-CM system. NCHS has developed a system for grouping individual ICD-9-CM codes into 162 general procedure categories (NCHS, 1981). We grouped the Georgia and Tennessee inpatient codes into these categories.

Tennessee inpatient and outpatient procedures and Georgia outpatient procedures are coded using CPT-4. We wanted to make our analyses as comparable as possible, so we wanted to group these CPT-4 codes into categories that were similar to the categories developed for ICD-9-CM. The CPT-4 and ICD-9-CM coding systems are very different, and currently there is no standard means for translating the codes from one system to the other. It was not feasible in the time available to develop a system that would convert CPT-4 codes into all of the ICD-9-CM categories. We therefore selected a subset of the ICD-9-CM categories and attempted to map CPT-4 codes into these selected categories.

Using aggregate payments as a criterion, we chose a subset of the 162 ICD-9-CM categories for mapping. We selected this subset of categories as follows. As noted above, Georgia and Michigan inpatient procedures are coded using ICD-9-CM. We grouped the inpatient codes in these States into the ICD-9-CM categories and ranked the categories in terms of aggregate payment. We then chose the top 50 aggregate payment procedures from Georgia and Michigan and merged the lists to produce an overall list of 62 unique categories. Study analysts, with clinical assistance, then went through the CPT-4 manual and identified CPT-4 codes that mapped into the 62 categories. Tennessee inpatient procedures are coded using CPT-4. Using the map that had been developed, we coded the Tennessee inpatient procedure data into the 62 categories. To be sure that we did not miss any inpatient codes that may be prominent in Tennessee, but not in the other States, we computed aggregate payments for all of the 62 procedure categories and all individual CPT-4 codes that had not been mapped into a category. Any individual codes that appeared in the top 50 in terms of aggregate payment were then mapped into an appropriate ICD-9-CM category,

and study analysts reviewed the CPT-4 manual for any additional CPT-4 codes that belonged in the category. Based on this procedure, a map was developed for an additional three categories. Thus, for the inpatient analysis, CPT-4 codes were mapped into 65 of the 162 ICD-9-CM categories. The counts for remaining individual CPT-4 codes that were not mapped into any category were included in the counts for aggregate payment and volume for "all procedures," but were not considered for inclusion in the actual lists of high volume or high payment procedures.

Note that the categories identified for mapping above were based on inpatient aggregate payments. For our outpatient analysis, we followed several additional steps to be sure we identified other procedure categories for mapping that could be prominent in an outpatient setting that were not prominent in an inpatient setting. Georgia and Tennessee outpatient procedures are coded using CPT-4. We began by computing aggregate payments for each CPT-4 code in these States and selected any code with aggregate payments greater than $2,500. There were three general groups of CPT-4 codes on this list. First, some of the CPT-4 codes on the list had already been mapped into ICD-9-CM categories for the inpatient analysis. These codes were put in the same categories as before and any additional codes that were mapped into the category for the inpatient analysis were also included in the category. Fifty-six of the 65 ICD-9-CM categories that were included in the inpatient analysis were thus also identified for the outpatient analysis. Second, some of the CPT-4 codes on the list could be mapped into ICD-9-CM categories that were not used in the inpatient analysis. In this case, the codes from the list were assigned to the appropriate category and study analysts went through the CPT-4 manual to find any additional codes that substantively belonged

in the category. Based on this procedure, CPT-4 codes were mapped into an additional 20 ICD-9-CM categories. Third, a few of the CPT-4 codes on the list could not be mapped into any of the ICD-9-CM categories. In these cases new categories were created. Study analysts then again went through the CPT-4 manual to identify any additional codes that belonged in the category. Ten new categories were created by this means.

Michigan used a State-specific coding scheme for its outpatient procedures. There is an existing method for converting these codes to CPT-4 codes. The Michigan outpatient procedure codes were thus grouped into categories as defined by the map developed above for Georgia and Tennessee. To be sure that we did not miss any outpatient codes that may be prominent in Michigan, but not in the other States, we then computed aggregate payments for the outpatient procedure categories and all individual State codes that had not been mapped into a category. Any individual State code that appeared in the top 50 in terms of aggregate payment was selected and mapped into an appropriate category. Study analysts then went through the State coding manual to find any additional codes that belonged substantively in the category. Using this procedure, an additional three outpatient categories were generated.

In sum, a total of 89 procedure categories were created for the outpatient analysis. The counts for remaining CPT-4 or State-specific codes that were not mapped into any procedure category were included in the counts for aggregate payment and volume for "all procedures," but were not considered for inclusion in the actual lists of high volume or high payment outpatient procedures.

Note that although not all of the CPT-4 system was mapped into the ICD-9-CM categories, 78 percent of inpatient surgical episodes in Tennessee, 88 percent of outpatient surgical episodes in Tennessee, 91 percent of outpatient surgical episodes in Georgia, and 90 percent of the outpatient surgical episodes in Michigan were for procedures that could be mapped into the selected categories.

The procedure categories, and the ICD-9-CM and CPT-4 codes that go into them, are presented in Appendix D. Note that some of the procedure categories are very broad and basically represent residual categories where "other" procedures are grouped. For example, category 007 is "other operations on the nervous system" (other similar categories are 009, 013, 018, 030, 039, 048, 052, 080, 093, 100, 119, 130, 151, 162). Such categories are too general to be useful for guiding the selection of procedures for an SSOP. Therefore, we included these procedures in our counts for "all procedures," but if they appeared in the top 10 in terms of volume or payment, we did not include them in our lists of high volume or high payment procedures.

C.3.2 Payment Rates

As noted above, a primary procedure was defined for each episode of care. All payments associated with the episode were assigned to this procedure. The payment rate for for a given procedure is thus defined to be the average payment for those episodes in which the procedure was the primary procedure. (Average payment is equal to total payments for episodes in which the procedure is the primary procedure divided by the number of episodes in which the procedure is the primary procedure.)

It must be noted that not all episodes of care involve only one procedure. It is not possible from our data to identify separately hospital payments that were associated with secondary procedures. We therefore assigned all payments to the primary procedure, but, in so doing, may overestimate the payment for that procedure in multiple-procedure episodes of care.

To get an idea of the size of this potential bias, we performed a sensitivity analysis by computing average payments using only single-procedure episodes and compared these results to those using our current approach. While single and multiple-procedure episodes may differ in many ways (e.g., severity of condition), this comparison should give some indication of how sensitive our results may be to the potential bias of assigning all payments to the primary procedure in multiple-procedure episodes.

Tables C.5 through C.7 present results for Georgia, Michigan, and Tennessee. In Georgia, 14,536 of the 25,631 total episodes were single-procedure episodes (57 percent). Over all procedures the difference in average payment is relatively small ($2,447 for all episodes versus $2,387 for single-procedure episodes). In addition, nine of the ten procedures that appeared on the high average payment list using all episodes also appeared in the top 10 when only single-procedure episodes were used.

In Michigan, 68 percent of all episodes were single-procedure episodes, and again, the difference in average payment over all procedures is small ($3,544 versus $3,222). All of the procedures in this State that appeared on the high average payment list using all episodes also appeared in the top 10 using single-procedure episodes.

Table C.5
Sensitivity Analysis for High Average Payment Inpatient Procedures,
Georgia, 1984

Procedure	All Episodes				Single-Procedure Episodes			
	Rank	Number Performed	Average $	Ratio to Overall Average	Rank	Number Performed	Average $	Ratio to Overall Average
Other open heart operations	1	34	8,925	3.65	1	6	7,987	3.35
Operations on the valves of the heart	2	14	8,039	3.29	3	2	5,808	2.43
Direct heart revascularization	3	27	7,277	2.97	2	6	6,414	2.69
Lung lobectomy and pneumenectomy	4	10	5,079	2.08	34	2	3,222	1.35
Temporary tracheostomy	5	19	4,949	2.02	7	7	4,723	1.98
Operations on vitreous	6	36	4,947	2.02	6	12	4,868	2.04
Spinal fusion	7	59	4,862	1.99	9	30	4,350	1.82
Extracranial ventricular shunt	8	118	4,488	1.83	5	82	4,905	2.05
Laminectomy	9	38	4,478	1.83	10	18	4,277	1.79
Cardiac catheterization	10	210	4,463	1.82	4	110	5,199	2.18
All procedures		25,631	2,447	1.00		14,536	2,387	1.00

Table C.6
Sensitivity Analysis for High Average Payment Inpatient Procedures,
Michigan, 1984

	All Episodes				Single-Procedure Episodes			
Procedure	Rank	Number Performed	Average $	Ratio to Overall Average	Rank	Number Performed	Average $	Ratio to Overall Average
Temporary tracheostomy	1	63	32,930	9.29	1	40	33,710	10.46
Operations on the valves of of the heart	2	57	17,443	4.92	3	23	17,957	5.57
Vagotomy	3	20	17,428	4.92	2	5	21,079	6.54
Direct heart revascularization	4	141	15,833	4.47	4	57	16,533	5.13
Ileostomy, colostomy, and other enterostomy	5	55	13,244	3.74	9	25	10,402	3.23
Incision and excision of the skull, brain, and cerebral meninges	6	231	12,132	3.42	6	138	11,876	3.69
Lung lobectomy and pneumenectomy	7	53	12,120	3.42	5	23	13,287	4.12
Partial gastrectomy	8	55	11,562	3.26	8	22	10,436	3.24
Other open heart operations	9	105	11,177	3.15	7	30	10,571	3.28
Spinal fusion	10	75	10,496	2.96	10	44	10,218	3.17
All procedures		46,718	3,544	1.00		31,810	3,222	1.00

Table C.7
Sensitivity Analysis for High Average Payment Inpatient Procedures,
Tennessee, 1984

	All Episodes				Single-Procedure Episodes			
Procedure	Rank	Number Performed	Average $	Ratio to Overall Average	Rank	Number Performed	Average $	Ratio to Overall Average
Operations on the valves of the heart	1	16	9,861	4.84	1	16	9,861	4.86
Temporary tracheostomy	2	17	9,397	4.61	2	15	8,927	4.40
Direct heart revascularization	3	35	7,845	3.85	3	34	7,836	3.86
Other open heart operations	4	44	7,638	3.75	4	44	7,638	3.76
Incision and excision of the skull, brain, and cerbral meninges	5	73	7,420	3.64	5	70	7,514	3.70
Spinal fusion	6	17	7,065	3.47	7	14	6,488	3.20
Intestinal anastomosis and repair	7	7	6,633	3.26	6	7	6,633	3.27
Resection of intestine	8	44	5,707	2.80	8	44	5,707	2.81
Arthroplasty and replacement of hip	9	32	5,683	2.79	9	32	5,683	2.80
Extracranial ventricular shunt	10	82	5,174	2.54	10	82	5,174	2.55
All procedures		23,527	2,037	1.00		23,220	2,030	1.00

In Tennessee, 99 percent of all episodes had only one procedure coded. This does not necessarily indicate that Tennessee is less likely to perform multiple procedures during a hospital stay, but only that they are less likely to code a secondary procedure on their inpatient Medicaid claims. As would be expected, there is virtually no difference between results based on all episodes and those based on single-procedure episodes in this State.

In summary, it appears from this sensitivity analysis that the effect of the bias of assigning all payments to the primary procedure is small.

Note also that measures of average payment can be strongly affected by episodes that have payments far beyond the payments for most episodes in which the procedure was performed. We removed such outliers from our data. Episodes for which the payment was more than 3 standard deviations from the mean payment for all episodes that involved that procedure were excluded. These outliers were removed from all analyses.

In addition, there are a number of procedures that are very expensive on the average, but are performed very few times. From a policy perspective, we are interested in identifying procedures that could reduce payments by the Medicaid program if included in a second opinion program. Procedures that are very expensive, but are rarely performed, are not good candidates. From a technical perspective, averages based on very few cases may be unstable. We, therefore, identified only high average payment procedures that had reasonably high volume. Specifically, our list of high average payment procedures was drawn only from procedures that were performed at least 10 times.

C.3.3 Aggregate Payments

Our measure of the aggregate payments for a procedure is the total amount paid by Medicaid (Federal and State shares) for episodes in which the procedure was the primary procedure.

As was the case with payment rates, our measure of aggregate payments may be biased for multiple-procedure episodes of care. As before, we attempted to see how sensitive our results may be to this potential bias by comparing inpatient results based on all episodes (i.e., the current approach) to those based only on single-procedure episodes. Tables C.8 through C.10 give these results for Georgia, Michigan, and Tennessee, respectively. In Georgia, eight of the ten procedures that were on the high aggregate payment list using all episodes were also in the top ten using only single-procedure episodes. A similar pattern holds in Michigan -- eight of the ten high aggregate payment procedures using the current approach also appeared in the top ten using only single-procedure episodes. Tennessee had very few episodes for which a secondary procedure was coded (99 percent of the episodes were single-procedure episodes, accounting for 98 percent of the total aggregate payments), and not surprisingly, the same ten procedures were high in aggregate payment using all episodes or only single-procedure episodes. Thus, the bias of using all episodes and assigning all payments to the primary procedure is not of great substantive importance in this case.

Table C.8
Sensitivity Analysis for High Aggregate Payment Inpatient Procedures,
Georgia, 1984

Procedure	All Episodes				Single-Procedure Episodes			
	Rank	Number Performed	Aggregate $ (in '000)	% of Total	Rank	Number Performed	Aggregate $ (in '000)	% of Total
Procedures to assist delivery	1	8,839	19,417.1	31.0	1	4,696	10,478.1	30.2
Caesarean section	2	728	1,651.5	2.6	2	530	1,176.0	3.4
Tonsillectomy with adenoidectomy	3	661	1,322.8	2.1	3	507	958.7	2.8
Abdominal hysterectomy	4	558	1,281.8	2.0	13	190	403.3	1.2
Cholecystectomy	5	450	1,172.1	1.9	9	203	496.7	1.4
Other bilateral destruction or occlusion of fallopian tubes	6	480	981.1	1.6	4	333	650.1	1.9
Cardiac catheterization	7	210	937.1	1.5	6	110	571.9	1.6
Colonoscopy and other endoscopies	8	370	912.4	1.5	8	227	514.0	1.5
Repair of inguinal hernia	9	371	809.1	1.3	7	264	566.8	1.6
Operations on muscles, tendons, fascia and bursa	10	276	740.7	1.2	11	185	480.9	1.4
All procedures		25,631	67,721.2	100.0		14,536	34,701.7	100.0

Table C.9
Sensitivity Analysis for High Aggregate Payment Inpatient Procedures,
Michigan, 1984

Procedure	All Episodes Rank	Number Performed	Aggregate $ (in '000)	% of Total	Single-Procedure Episodes Rank	Number Performed	Aggregate $ (in '000)	% of Total
Caesarean section	1	5,785	21,141.6	12.8	1	4,631	17,025.8	16.6
Procedures to assist delivery	2	9,570	18,985.1	11.5	2	6,177	11,915.8	11.6
Cholecystectomy	3	1,382	5,101.0	3.1	3	884	3,164.1	3.1
Colonoscopy and other endoscopies	4	930	3,761.9	2.3	4	721	2,681.0	2.6
Abdominal hysterectomy	5	1,081	3,702.3	2.2	10	423	1,483.1	1.4
Incision and excision of the skull, brain, and cerebral meninges	6	231	2,802.9	1.7	9	138	1,638.9	1.6
Laparotomy	7	414	2,596.9	1.6	18	152	970.2	0.9
Open reduction of fracture	8	621	2,538.7	1.5	8	445	1,692.0	1.7
Appendectomy, excluding incidental	9	944	2,441.0	1.5	5	836	2,064.1	2.0
Systematic shunt and graft bypass	10	238	2,305.0	1.4	12	149	1,281.6	1.3
All procedures		46,718	165,585.4	100.0		31,810	102,499.0	100.0

Table C.10
Sensitivity Analysis for High Aggregate Payment Inpatient Procedures,
Tennessee, 1984

Procedure	All Episodes				Single-Procedure Episodes			
	Rank	Number Performed	Aggregate $ (in '000)	% of Total	Rank	Number Performed	Aggregate $ (in '000)	% of Total
Procedures to assist delivery	1	9,365	13,300.8	26.3	1	9,260	13,126.0	26.4
Caesarean section	2	2,030	5,974.3	11.8	2	2,009	5,909.5	11.9
Abdominal hysterectomy	3	443	1,591.6	3.1	3	436	1,568.8	3.2
Cholecystectomy	4	414	1,549.3	3.1	4	413	1,540.8	3.1
Other bilateral destruction or occlusion of fallopian tubes	5	814	1,497.3	3.0	5	801	1,472.1	3.0
Open reduction of fracture	6	252	813.5	1.6	6	250	798.9	1.6
Colonoscopy and other ndoscopies	7	398	792.8	1.6	7	395	781.2	1.6
Laparotomy	8	171	647.3	1.3	9	165	611.7	1.2
Tonsillectomy with adenoidectomy	9	662	630.1	1.2	8	660	628.7	1.3
Unilateral oophorectomy and salpingo-oophorectomy	10	185	573.6	1.1	10	184	570.0	1.1
All procedures		23,527	50,562.4	100.0		23,220	49,651.8	100.0

C.3.4 Rate of Performance

Unadjusted Rates. In the Tape-to-Tape States, our measure of the rate at which a procedure is performed is defined to be the number of episodes in which the procedure is the primary procedure divided by the number of people ever enrolled in Medicaid in the State in 1984 (excluding those enrolled in both Medicare and Medicaid). For the comparison group from the NHDS, the rate at which a procedure is performed is defined to be the number of episodes in which the procedure is the primary procedure divided by the size of the U.S. population under age 65.

These measures maintain consistency with the measures of payment rates and aggregate payments by focusing on the number of episodes in which a given procedure was the primary procedure. In so doing, however, this method may underestimate the total volume of the procedure because it does not include the number of times it was performed as a secondary procedure in multiple-procedure episodes.

To assess the size of this bias, we also computed rates of performance by counting the number of times each procedure was performed as a primary or secondary procedure. Tables C.11 through C.13 compare these results to those using the current method for Georgia, Michigan, and Tennessee, respectively. In Georgia, the rate of performance is higher overall when primary and secondary procedures are considered (5,873 versus 8,210 per 100,000 enrolled). The rates for several procedures are especially affected. The rate for "procedures to assist delivery" went from 2,025 per 100,000 enrolled to 2,876. This does not indicate that a large number of deliveries are being performed as secondary procedures.

Table C.11
Sensitivity Analysis for High Volume Inpatient Procedures,
Georgia, 1984

Procedure	Primary Procedure			Primary or Secondary Procedure		
	Rank	Number Performed	Rate per 100,000 Enrolled	Rank	Number Performed	Rate per 100,000 Enrolled
Procedures to assist delivery	1	8,839	2,025	1	12,549	2,876
Caesarean section	2	728	167	3	794	182
Tonsillectomy with adenoidectomy	3	661	151	4	680	156
Abdominal hysterectomy	4	558	128	5	585	134
Other bilateral destruction or occlusion of fallopian tubes	5	480	110	2	1,083	248
Cholecystectomy	6	450	103	7	470	108
Repair of inguinal hernia	7	371	85	10	409	94
Colonoscopy and other endoscopies	8	370	85	6	522	120
Dilation and curettage of uterus after delivery or abortion	9	370	85	12	388	89
Diagnostic dilation and curettage	10	289	66	11	403	92
All procedures		25,631	5,873		35,829	8,210

Table C.12
Sensitivity Analysis for High Volume Inpatient Procedures,
Michigan, 1984

Procedure	Primary Procedure			Primary or Secondary Procedure		
	Rank	Number Performed	Rate per 100,000 Enrolled	Rank	Number Performed	Rate per 100,000 Enrolled
Procedures to assist delivery	1	9,570	913	1	12,601	1,202
Caesarean section	2	5,785	552	2	5,795	553
Dilation and curettage of uterus after delivery or abortion	3	1,501	143	3	1,583	151
Cholecystectomy	4	1,382	132	5	1,435	137
Abdominal hysterectomy	5	1,081	103	8	1,123	107
Appendectomy, excluding incidental	6	944	90	9	1,040	99
Colonoscopy and other endoscopies	7	930	89	6	1,196	114
Other bilateral destruction or occlusion of fallopian tubes	8	881	84	4	1,496	143
Intraamniotic injection for abortion	9	684	65	14	684	65
Tonsillectomy with adenoidectomy	10	664	63	15	677	65
All procedures		46,718	4,457		60,319	5,755

Table C.13
Sensitivity Analysis for High Volume Inpatient Procedures,
Tennessee, 1984

Procedure	Primary Procedure			Primary or Secondary Procedure		
	Rank	Number Performed	Rate per 100,000 Enrolled	Rank	Number Performed	Rate per 100,000 Enrolled
Procedures to assist delivery	1	9,365	2,899	1	9,418	2,916
Caesarean section	2	2,030	628	2	2,035	630
Other bilateral destruction or occlusion of fallopian tubes	3	814	252	3	885	274
Tonsillectomy with adenoidectomy	4	662	205	4	663	205
Abdominal hysterectomy	5	443	137	5	446	138
Cholecystectomy	6	414	128	6	414	128
Colonoscopy and other endoscopies	7	398	123	7	403	125
Repair of inguinal hernia	8	280	87	8	280	87
Tonsillectomy without adenoidectomy	9	273	85	9	274	85
Appendectomy, excluding incidental	10	253	78	11	256	79
All procedures		23,527	7,283		23,829	7,377

It simply indicates that more than one procedure was performed to assist the delivery in a number of cases (e.g., intrauterine fetal monitoring during labor, and an episiotomy at the time of delivery). The rate for "other bilateral destruction or occlusion of fallopian tubes" was 110 per 100,000 enrolled when only primary procedures were considered and 248 when primary and secondary procedures were considered. The rate for "colonoscopy and other endoscopies" was 85 per 100,000 enrolled for primary procedures and 120 for primary and secondary procedures. Note, however, that eight of the ten procedures that appeared on the high volume list using only primary procedures also appear in the top ten when primary and secondary procedures are considered.

The pattern is similar in Michigan. The overall rate is higher when primary and secondary procedures are considered, with the rates for "procedures to assist delivery," "other bilateral destruction or occlusion of fallopian tubes," and "colonoscopy and other endoscopies" being especially higher. However, as in Georgia, eight of the ten procedures that appeared on the high volume list using only primary procedures also appeared in the top ten when primary and secondary procedures are considered.

In Tennessee, very few episodes had a secondary procedure coded. Thus, the rates per 100,000 enrolled and ranking of high volume procedures are largely the same when using only the primary procedure and using primary and secondary procedures.

In summary, we chose to present rates of performance focusing on the number of times a given procedure was the primary procedure performed in order to maintain consistency with the measures of payment rates and aggregate payments. When counts of primary and secondary procedures are

used, rates of performance may be somewhat higher, but a sensitivity analysis suggests that the lists of procedures identified as high volume are not affected to a great extent.

Note an additional point about the denominator used in the calculation of the rates. As noted above, the denominator used in the calculations was the number of people ever enrolled in Medicaid in the State in 1984. This count does not take into account the fact that people may be enrolled in Medicaid only part of the year. An alternate approach is to use a count of person-years of enrollment. With this approach individuals are differentially weighted by the proportion of the year they are enrolled in the program. For example, a person enrolled for the full year would receive a weight of 1.0 while an individual enrolled for 6 months of the year would receive a weight of .5. Thus, for a hypothetical population made up of six people enrolled for the full year and four people each enrolled for 6 months, the count of persons ever enrolled would be 10, but the count of person-years of enrollment would be 8 (i.e., $1.0(6)+.5(4)= 8$).

Because many people only become eligible for Medicaid because of medical conditions (e.g., pregnancy), we used the count of persons ever enrolled for the rates presented in Chapter 3. To examine the sensitivity of the rate calculation, we also computed rates based on person-years of enrollment for comparison purposes. Tables C.14 through C.16 compare rates based on person-years of enrollment to rates based on the number of persons ever enrolled for high volume inpatient procedures in Georgia, Michigan, and Tennessee. As can be seen from these tables, the use of person-years of enrollment in the denominator of the rate calculation generally increased the rate by approximately 20-30 percent.

Table C.14
Sensitivity Analysis of Use of Different Denominators in Rate Calculation,
High Volume Inpatient Procedures, Georgia, 1984

Rank	Procedure	Number Performed	Ever Enrolled in Denominator: Rate per 100,000 Enrolled	Ever Enrolled in Denominator: Adjusted Rate per 100,000 Enrolled	Person-Years in Denominator: Rate per 100,000 Enrolled	Person-Years in Denominator: Adjusted Rate per 100,000 Enrolled
1	Procedures to assist delivery	8,839	2,025	1,780	2,553	2,241
2	Caesarean section	728	167	146	210	185
3	Tonsillectomy with adenoidectomy	661	151	82	191	105
4	Abdominal hysterectomy	558	128	129	161	158
5	Other bilateral destruction or occlusion of fallopian tubes	480	110	97	139	122
6	Cholecystectomy	450	103	129	130	156
7	Repair of inguinal hernia	371	85	124	107	153
8	Colonoscopy and other endoscopies	370	85	124	107	147
9	Dilation and curettage of uterus after delivery or abortion	370	85	74	107	94
10	Diagnostic dilation and curettage	289	66	66	83	81
	All procedures	25,631	5,873	5,780	7,403	7,277

Table C.15
Sensitivity Analysis of Use of Different Denominators in Rate Calculation,
High Volume Inpatient Procedures, Michigan, 1984

Rank	Procedure	Number Performed	Ever Enrolled in Denominator: Rate per 100,000 Enrolled	Ever Enrolled in Denominator: Adjusted Rate per 100,000 Enrolled	Person-Years in Denominator: Rate per 100,000 Enrolled	Person-Years in Denominator: Adjusted Rate per 100,000 Enrolled
1	Procedures to assist delivery	9,570	913	795	1,178	1,007
2	Caesarean section	5,785	552	487	712	608
3	Dilation and curettage of uterus after delivery or abortion	1,501	143	127	185	158
4	Cholecystectomy	1,382	132	184	170	227
5	Abdominal hysterectomy	1,081	103	115	133	143
6	Appendectomy, excluding incidental	944	90	87	116	111
7	Colonoscopy and other endoscopies	930	89	140	114	175
8	Other bilateral destruction or occlusion of fallopian tubes	881	84	74	108	93
9	Intraamniotic injection for abortion	684	65	58	84	72
10	Tonsillectomy with adenoidectomy	664	63	36	82	46
	All procedures	46,718	4,457	4,538	5,751	5,804

Table C.16
Sensitivity Analysis of Use of Different Denominators in Rate Calculation,
High Volume Inpatient Procedures, Tennessee, 1984

Rank	Procedure	Number Performed	Ever Enrolled in Denominator: Rate per 100,000 Enrolled	Ever Enrolled in Denominator: Adjusted Rate per 100,000 Enrolled	Person-Years in Denominator: Rate per 100,000 Enrolled	Person-Years in Denominator: Adjusted Rate per 100,000 Enrolled
1	Procedures to assist delivery	9,365	2,899	2,589	3,775	3,378
2	Caesarean section	2,030	628	560	818	732
3	Other bilateral destruction or occlusion of fallopian tubes	814	252	223	328	294
4	Tonsillectomy with adenoidectomy	662	205	120	267	159
5	Abdominal hysterectomy	443	137	135	179	171
6	Cholecystectomy	414	128	153	167	189
7	Colonoscopy and other endoscopies	398	123	164	160	204
8	Repair of inguinal hernia	280	87	120	113	151
9	Tonsillectomy without adenoidectomy	273	85	74	110	97
10	Appendectomy, excluding incidental	253	78	80	102	103
	All procedures	23,527	7,283	7,137	9,484	9,275

Finally, note that we did not attempt to identify specific risk groups for the calculation of the rates. Rather, we focused on the policy issue of total program experience, and therefore presented rates based on total Medicaid enrollees. For the interested reader Tables C.17 through C.19 present rates for specific age and sex risk groups for high volume inpatient procedures for Georgia, Michigan, and Tennessee.

Adjusted Rates. In order to compare rates of performance for the Medicaid population to the rates of performance for the comparison group, we computed adjusted rates of performance for each procedure in the Tape-to-Tape States. These rates statistically adjust for age and sex differences between the Medicaid population and the population represented in the NHDS. Thus, the adjusted rate of performance represents the expected rate of performance of a procedure in the State Medicaid population if the age and sex composition of this population was the same as that of the entire U.S. population under age 65. This method of adjustment, called indirect standardization, is described next.

Indirect standardization is based on a simple logical foundation. If the procedures performed in a given population are stratified by a factor such as age, then one can calculate the age-specific procedure rates for the sample. The observed (overall) procedure rate may be calculated by multiplying each age-specific rate by its proportion of the sample and summing over all levels of the factor. Figure C.1 presents these calculations for two hypothetical State populations stratified by three levels of age. As the figure shows, contributions to the observed procedure rate are made by both the schedule of age-specific procedure rates (the r_{ij}'s) and the distribution of patients by age (P_{ij}). Thus, a difference between two populations may be attributed to a

Table C.17
Rates per 100,000 Medicaid Enrollees for Age and Sex-Specific Risk Groups,
High Volume Inpatient Procedures,
Georgia, 1984

Rank	Procedure 1/	Overall	Males			Females		
			0-14 Years	15-44 Years	45-64 Years	0-14 Years	15-44 Years	45-64 Years
1	Procedures to assist delivery	2,025	0	0	0	85	6,397	17
2	Caesarean section	167	0	0	0	7	527	0
3	Tonsillectomy with adenoidectomy	151	247	37	0	297	50	0
4	Abdominal hysterectomy	128	0	0	0	2	375	128
5	Other bilateral destruction or occlusion of fallopian tubes	110	0	0	0	0	352	0
6	Cholecystectomy	103	2	24	86	3	225	340
7	Repair of inguinal hernia	85	218	98	191	37	21	6
8	Colonoscopy and other endoscopies	85	6	90	218	8	115	384
9	Dilation and curettage of uterus after delivery or abortion	85	0	0	0	5	267	0
10	Diagnostic dilation and curettage	66	0	0	0	4	171	154
	All procedures	5,873	2,048	3,342	5,506	1,496	12,851	6,598

1/ Some procedure/risk group combinations that are not possible (e.g., abdominal hysterectomy for males) had nonzero rates. Such rates were assumed to reflect coding errors and values of zero were assigned.

Table C.18
Rates per 100,000 Medicaid Enrollees for Age and Sex-Specific Risk Groups,
High Volume Inpatient Procedures,
Michigan, 1984

Rank	Procedure 1/	Overall	Males			Females		
			0-14 Years	15-44 Years	45-64 Years	0-14 Years	15-44 Years	45-64 Years
1	Procedures to assist delivery	913	0	0	0	10	2,919	0
2	Caesarean section	552	0	0	0	5	1,765	9
3	Dilation and curettage of uterus after delivery or abortion	143	0	0	0	3	455	13
4	Cholecystectomy	132	0	39	142	2	334	409
5	Abdominal hysterectomy	103	0	0	0	0	289	300
6	Appendectomy, excluding incidental	90	78	138	73	56	110	33
7	Colonoscopy and other endoscopies	89	3	89	394	3	128	551
8	Other bilateral destruction or occlusion of fallopian tubes	84	0	0	0	0	269	2
9	Intraamniotic injection for abortion	65	0	0	0	8	203	0
10	Tonsillectomy with adenoidectomy	63	137	3	0	119	10	0
	All procedures							

1/ Some procedure/risk group combinations that are not possible (e.g., abdominal hysterectomy for males) had nonzero rates. Such rates were assumed to reflect coding errors and values of zero were assigned.

Table C.19
Rates per 100,000 Medicaid Enrollees for Age and Sex-Specific Risk Groups,
High Volume Inpatient Procedures,
Tennessee, 1984

Rank	Procedure 1/	Overall	Males			Females		
			0-14 Years	15-44 Years	45-64 Years	0-14 Years	15-44 Years	45-64 Years
1	Procedures to assist delivery	2,899	0	0	0	392	8,854	14
2	Caesarean section	628	0	0	0	57	1,957	7
3	Other bilateral destruction or occlusion of fallopian tubes	252	0	0	0	0	814	0
4	Tonsillectomy with adenoidectomy	205	429	35	7	387	50	4
5	Abdominal hysterectomy	137	0	0	0	1	366	266
6	Cholecystectomy	128	0	35	99	1	269	416
7	Colonoscopy and other endoscopies	123	13	102	376	14	158	465
8	Repair of inguinal hernia	87	206	73	298	43	20	28
9	Tonsillectomy without adenoidectomy	85	83	44	0	113	113	7
10	Appendectomy, excluding incidental	78	94	82	36	63	100	17
	All procedures	7,283	2,704	3,166	5,184	2,159	16,360	6,450

1/ Some procedure/risk group combinations that are not possible (e.g., abdominal hysterectomy for males) had nonzero rates. Such rates were assumed to reflect coding errors and values of zero were assigned.

difference in the schedule of age-specific procedure rates or to a difference in the age distribution.

If the schedule of age-specific rates can be assumed to be the same or constant across populations, then one may apply this constant set of procedure rates to the differential age distributions of various populations to calculate an expected procedure rate based on age (sometimes, as shown in Figure C.1, the average age-specific procedure rates are used, and sometimes age-specific rates from a standard comparison population are used). This technique is illustrated by the equations under "B" in Figure C.1. The observed age proportions in each State are multiplied by the pooled schedule of age-specific procedure rates resulting in an expected value. The observed rates may now be compared to the expected. Typically one takes the ratio of the observed to the expected, called the standardized rate ratio (SRR). The observed procedure rate is adjusted to remove the influence of age by multiplying the average or standard population procedure rate by the SRR. This technique is illustrated by the equations under "C" in Figure C.1. The adjusted procedure rates for two populations may be compared and the difference interpreted as being the differential procedure volume in the two populations with the effect of age removed. This technique may be generalized to any factor and to any number of factors. In the present analysis, procedure rates were adjusted for age and sex.

One variable in the application of indirect standardization is the source of the factor-specific rates. In Figure C.1, the weighted sum of the individual State-specific rates is used. Another common procedure, especially when standardizing State-level data, is to use the schedule of factor-specific rates for the U.S. as a whole. Thus, in the example of

Figure C.1

Illustration of Indirect Standardization
Standardization of Procedure Rates by Age in Two States

	State 1		State 2		Pooled Total
Age	Procedure Rate	Proportion This Age	Procedure Rate	Proportion This Age	Procedure Rate
1	r_{11}	p_{11}	r_{12}	p_{12}	r_{1+}
2	r_{21}	p_{21}	r_{22}	p_{22}	r_{2+}
3	r_{31}	p_{31}	r_{32}	p_{32}	r_{3+}

[A] Observed Procedure Rates:

$$r_{+1} = r_{11} \cdot p_{11} + r_{21} \cdot p_{21} + r_{31} \cdot p_{31}$$

$$r_{+2} = r_{12} \cdot p_{12} + r_{22} \cdot p_{22} + r_{32} \cdot p_{32}$$

[B] Expected Procedure Rates:

$$r_{+1(exp)} = r_{1+} \cdot p_{11} + r_{2+} \cdot p_{21} + r_{3+} \cdot p_{31}$$

$$r_{+2(exp)} = r_{1+} \cdot p_{12} + r_{2+} \cdot p_{22} + r_{3+} \cdot p_{32}$$

[C] Adjusted Procedure Rates:

$$r_{+1(adj)} = r_{++} \cdot (r_{+1} / r_{+1(exp)})$$

$$r_{+2(adj)} = r_{++} \cdot (r_{+2} / r_{+2(exp)})$$

Notation and subscripts in the table are as follows:
r = A procedure rate, e.g., the number of procedures per 100,000.
p = The proportion of persons in a category. Thus p_{11} is the proportion of persons in Age 1 within State 1.
i = Level of Age, the row variable. It is the first subscript.
j = A State, the column variable. It is the second subscript.
+ = The total or pooled value for all ages or all States. Thus, r_{1+} is the Age 1-specific rate pooled across States. r_{++} is the rate for all ages and both States.

Figure C.1, the values r_{1+}, r_{2+} and r_{3+} would be replaced by age-specific procedure rates based on national data. In the present analysis, estimated age and sex-specific procedure rates based on data from the under age 65 portion of the NHDS were used in the inpatient analysis, and estimated age and sex-specific procedure rates based on pooled data from the three sample States were used in the outpatient analysis. In each case, these are combined with State-specific proportions of age and sex to produce expected procedure rates. The age and sex distributions are presented in Table C.20. The expected procedure rates then are used to produce adjusted procedure rates for the States.

C.3.5 Number of Physicians

The mandate asks that we present the number of board-certified and board-eligible physicians who perform high volume and high cost procedures. We were not able to determine board certification in our data, so we simply present the number of providers performing procedures.

We measured the number of providers who performed a given procedure by counting the number of unique provider identification numbers on claims for physician fees that were associated with episodes in which the procedure was the primary procedure performed. Note that this measure must be taken only as a rough indicator of the number of physicians actually performing the procedure for the following reasons: some physicians may have multiple provider identification numbers; some identification numbers pertain to groups of physicians rather than individuals; it does not include physicians, such as hospital residents, who may perform procedures but may not submit separate claims for

Table C.20

MEDICAID ENROLLEES AND THE U.S. POPULATION BY AGE AND SEX (1)

GEORGIA

AGE GROUP	MALE	FEMALE	TOTAL
Newborn - 14	107,611	105,296	212,907
15-44	37,912	136,032	173,944
45-64	15,146	34,406	49,552
TOTAL	160,669	275,734	436,403

MICHIGAN

AGE GROUP	MALE	FEMALE	TOTAL
Newborn - 14	248,407	240,294	488,701
15-44	162,019	326,827	488,846
45-64	24,605	45,938	70,543
TOTAL	435,031	613,059	1,048,090

TENNESSEE

AGE GROUP	MALE	FEMALE	TOTAL
Newborn - 14	74,598	71,849	146,447
15-44	34,273	99,628	133,901
45-64	14,081	28,603	42,684
TOTAL	122,952	200,080	323,032

U.S.

AGE GROUP	MALE	FEMALE	TOTAL
Newborn - 14	26,475,000	25,259,000	51,734,000
15-44	54,095,000	55,862,000	109,957,000
45-64	21,329,000	23,382,000	44,711,000
TOTAL	101,899,000	104,503,000	206,402,000

Sources: Computations based on Tape-to-Tape early returns files; NCHS (1986)

Notes: (1) The early returns files exclude HMO, refugee, and state-only Medicaid enrollees as well as other federal enrollment groups.

physician fees. The extent of these biasing factors in unknown. This measure must therefore be interpreted with caution.

APPENDIX D

Procedure Coding Tables

Table D.1
Mapping of Procedure Codes into Procedure Categories

Procedure Category	Label	ICD-9-CM Codes	CPT-4 Codes
	OPERATIONS ON THE NERVOUS SYSTEM:		
001	Incision and excision of the skull, brain, and cerebral meninges	01.00-01.09 01.20-01.69	61000-61099 61100-61109 61154-61571 61720-61791 21020
002	Extracranial ventricular shunt	02.30-02.49	62190-62199 62220-62230 62250-62259
003	Laminectomy	03.00-03.09	a/
004	Spinal tap	03.31	62270 62272
005	Injection of agent into spinal canal	03.91-03.92	a/
006	Operations on the cranial and peripheral nerves	04.00-04.09 04.20-04.99	64400-64679 64681-64801 64825-64907 28080
007	Other operations on the nervous system	01.10-01.19 02.00-02.29 02.90-02.99 03.10-03.29 03.32-03.89 03.90 03.93-03.99 04.10-04.19 05.00-05.99	a/
	OPERATIONS ON THE ENDOCRINE SYSTEM:		
008	Thyroidectomy	06.20-06.69	60200-60270
009	Other operations on the endocrine system	06.00-06.19 06.70-07.99	a/
	OPERATIONS ON THE EYE:		
010	Extraction of lens and insertion of prosthesis	13.10-13.99	66800-66985
011	Operations on vitreous	14.70-14.79	a/
012	Resection and recession of ocular muscle	15.10-15.69	67311-67332

013A	Photocoagulation of retinal detachment or lesion	b/	67105-67106 67145 67210 67216 67226 67228
013B	Excision or destruction of lesion or tissue of eyelid	b/	67800-67808 67836-67850
013	Other operations on the eye	08.00-13.09 14.00-14.69 14.80-15.09 15.70-16.99	65091-66770
	OPERATIONS ON THE EAR:		
014	Tympanoplasty	19.40-19.59	69604 69611-69646
015	Myringotomy	20.00-20.09	69420 69433-69437
016	Mastoidectomy	20.40-20.49	a/
017	Operations on the Eustachian tube	20.80-20.89	a/
018	Other operations on the ear	18.00-19.39 19.60-19.99 20.10-20.39 20.50-20.79 20.90-20.99	a/
	OPERATIONS ON THE NOSE, MOUTH AND PHARYNX:		
019	Submucous resection of nasal septum	21.50-21.59	a/
020	Incision, excision and destruction of nose and lesion of nose	21.10-21.19 21.30-21.49 21.60-21.69	a/
021	Reduction of nasal fracture	21.70-21.79	a/
022	Rhinoplasty and repair of nose	21.80-21.89	30400-30630
023	Forceps extraction of tooth	23.00-23.09	a/
024	Surgical removal of tooth	23.10-23.19	a/
025	Restoration of tooth	23.20-23.49	a/
026	Plastic operations on mouth and palate	27.50-27.69	a/
027	Tonsillectomy without adenoidectomy	28.20-28.29	42825-42826
028	Tonsillectomy with adenoidectomy	28.30-28.39	42820-42821

029	Adenoidectomy without tonsillectomy	28.60-28.69	42830-42836
030A	Plastic operations on teeth, gums, and alveoli	b/	41870-41874
030B	Sinusotomy	b/	31020-31033 31050-31090
030	Other operations on nose, mouth, and pharynx	21.00-21.09 21.20-21.29 21.90-22.99 23.50-27.49 27.70-28.19 28.40-28.59 28.70-29.99	a/
	OPERATIONS ON THE RESPIRATORY SYSTEM:		
031	Excision or destruction of lesion or tissue of larynx	30.00-30.09	31540-31541 31578 31512
032	Temporary tracheostomy	31.10-31.19	31600-31610
033	Laryngoscopy and tracheoscopy	31.41-31.42	31505 31520-31526 31575 31615
034	Lung lobectomy and pneumonectomy	32.30-32.59	a/
035	Bronchoscopy	33.21-33.23	31620-31621
036	Incision of chest wall and pleura	34.00-34.09	32000 32035-32036 32100-32199
037	Thoracentesis	34.91	a/
038	Biopsy and other diagnostic procedures on the respiratory system	31.40 31.43-31.49 33.24-33.29 34.20-34.29	31510 31535-31536 31576 31625-31626 31628 31717 32095 32400-32405 32700-32705 39400
039	Other operations on the respiratory system	30.10-31.09 31.20-31.39 31.50-32.29 32.60-33.19 33.30-33.99 34.10-34.19	a/

		34.30-34.89 34.92-34.99	
	OPERATIONS ON THE CARDIOVASCULAR SYSTEM:		
040	Operations on valves of heart	35.10-35.29 35.99	33400-33417 33422-33430 33452-33468 33472-33492
041	Direct heart revascularization	36.10-36.19	33510-33528
042	Other open heart operations	35.30-35.51 35.53-35.98 36.00-36.09 36.20-36.29 36.90-36.99 37.10-37.11 37.32-37.33 37.50-37.59	33310-33315 33542-33730 33786-33788 33930-33945 92982-92984
043	Cardiac catheterization	37.21-37.23	93501-93503 93510-93528
044	Pacemaker insertion, removal, replacement, and repair	37.70-37.89	a/
045	Ligation and stripping of varicose veins	38.50-38.59	a/
046	Systematic shunt and graft bypass	39.00-39.29	35501-35671 33735-33766 36800-37181
047	Hemodialysis	39.95	a/
048A	Puncture of vessel	b/	36000-36140 36160-36250 36400-36425 36500 36510 36600-36625 36660
048	Other operations on the cardiovascular system	35.00-35.09 35.52 36.30-36.39 37.00-37.09 37.12 37.24-37.31 37.40-37.49 37.60-37.69 37.90-38.49 38.60-38.99 39.30-39.94 39.96-39.99	a/

	OPERATIONS ON THE HEMIC AND LYMPHATIC SYSTEM:		
049	Excision of lymphatic structures	40.20-40.59	a/
050	Biopsies on the hemic and lymphatic system	40.10-40.19 41.30-41.39	38500-38530 85095 85098-85102
051	Splenectomy	41.50-41.59	a/
052	Other operations on the hemic and lymphatic system	40.00-40.09 40.60-41.29 41.40-41.49 41.90-41.99	a/
	OPERATIONS ON THE DIGESTIVE SYSTEM:		
053	Esophagoscopy and gastroscopy (natural orifice)	42.23 44.13	43200 43234
054	Dilation of esophagus	42.92	a/
055	Gastrostomy	43.10-43.29	a/
056	Pyloromyotomy	43.30-43.39	a/
057	Partial gastrectomy	43.50-43.89	a/
058	Local excision and destruction of lesion and tissue of stomach and intestine	43.40-43.49 45.30-45.49	a/
059	Vagotomy	44.00-44.09	a/
060	Colonoscpoy and other endoscopies	45.13 45.23-45.24	43235 44360 44385 45330 45360 45378
061	Resection of intestine	45.60-45.89	44120-44125 44140-44160
062	Intestinal anastomosis and repair	45.90-45.99 46.40-46.99	44312-44314 44340-44345 44620-44625 44130-44131
063	Ileostomy, colostomy, and other enterostomy	46.10-46.39	a/
064	Appendectomy, excluding incidental	47.00-47.09	44950-44960
065	Local incision and destruction of lesion and tissue of rectum and anus except anal fistula	48.30-48.39 49.30-49.39	a/
066	Resection of rectum	48.60-48.69	a/

067	Incision or excision of peritoneal tissue or lesion	48.80-48.89	a/
068	Excision or incision of anal fistula	49.10-49.19	a/
069	Hemorrhoidectomy	49.43-49.46	a/
070	Cholecystectomy	51.20-51.29	47600-47620
071	Incision of bile duct for relief of obstruction	51.40-51.49	a/
072	Repair of inguinal hernia	53.00-53.19	49500-49535
073	Repair of umbilical hernia	53.40-53.49	49580-49581 49600-49611
074	Other hernia repair	53.20-53.39 53.50-53.99	49540-49575 49590-49599 49612-49629
075	Laparotomy	54.10-54.19	49000-49002 49020 49040
076	Laparoscopy	54.20-54.29	49180 49300-49303 58980 58986
077	Incision and excision of abdominal wall and peritoneum except laparotomy	54.00-54.09 54.30-54.49 54.91	49010 49041-49081 49200-49255
078	Division of peritoneal adhesions	54.50-54.59	44000-44005 58985
079	Biopsies and other endoscopies of the digestive system	42.21-42.22 42.24 44.11-44.12 44.14-44.15 45.10-45.12 45.14-45.22 45.25-45.29 48.20-48.29 49.20-49.29 51.10-51.19 52.10-52.19	43202 43239 43600-43605 44361 44380 44382 44386 44388 44389 44100 45100-45105 45300 45302 45305 45331 45355 45365 45380 46600

			46602 46606 47550-47552 47553 48100-48102
080	Other operations on the digestive system	42.00-42.19 42.29-42.91 42.93-43.09 43.90-43.99 44.19-45.09 45.50-45.59 46.00-46.09 47.10-48.19 48.40-48.59 48.70-48.79 48.90-49.09 49.41-49.42 49.47-51.09 51.30-51.39 51.50-52.09 52.20-52.99 54.60-54.79 54.90 54.92-54.99	a/
	OPERATIONS ON THE URINARY SYSTEM:		
081	Nephrotomy, pyelotomy and complete nephrectomy	55.00-55.19 55.50-55.59	50040-50075 50120-50135 50220-50236
082	Endoscopies of the urinary system through natural orifice	55.21-55.22 56.31 57.32 58.22	50551-50553 50570 50572 50951-50953 50970 50972 52000-52005 52010
083	Ureterotomy	56.20-56.29	a/
084	Transurethral excision or destruction of bladder tissue	57.40-57.49	52224-52265
085	Urethral meatotomy	58.10-58.19	a/
086	Dilation of urethra	58.60-58.69	53600-53621 53660-53665 52280
087	Retropubic urethral suspension	59.50-59.59	a/
088	Ureteral catheterization	59.80-59.89	a/

089	Biopsies and other endoscopies of the urinary system	55.23-55.24 56.32-56.33 57.31 57.33-57.34 58.21 58.23-58.24 59.20-59.29	50200-50205 50555 50574 50955 50974 52007 52204 52338 53200
090	Repair of urinary bladder except transurethral	57.80-57.89	a/
091	Insertion or replacement of indwelling urinary catheter	57.94-57.95	53670-53675
092	Repair of urethra	58.40-58.59	a/
093A	Excision or destruction of urethral tissue or lesion	b/	53210-53269 53271-53275 52214 52340
093	Other operations on the urinary system	55.29-55.49 55.60-56.19 56.39-57.29 57.30 57.39 57.50-57.79 57.90-57.93 57.96-58.09 58.29-58.39 58.90-59.19 59.30-59.49 59.60-59.79 59.90-59.99	a/
	OPERATIONS ON THE MALE GENITAL ORGANS:		
094	Prostatectomy	60.20-60.69	a/
095	Excision of hydrocele and other lesion of tunica vaginalis	61.20-61.29 61.92	a/
096	Orchiectomy and orchiopexy	62.30-62.59	54520-54659
097	Vasectomy and ligation of vas deferens	63.70-63.79	a/
098	Circumcision	64.00-64.09	54150-54161
099	Biopsies and other diagnostic procedures on the male genital organs	60.10-60.19 61.10-61.19 62.10-62.19 63.00-63.09 64.10-64.19	a/
100	Other operations on the male genital organs	60.00-60.09	a/

		60.70-61.09 61.30-61.91 61.99-62.09 62.20-62.29 62.60-62.99 63.10-63.69 63.80-63.99 64.20-64.99	
	OPERATIONS ON THE FEMALE GENITAL ORGANS:		
101	Local excision or destruction of ovarian lesion or tissue	65.20-65.29	58920-58925
102	Unilateral oophorectomy and salpingo-oophorectomy	65.30-65.49	58940-58945 58720
103	Biltateral oophorectomy and salpingo-oophorectomy	65.50-65.69	a/
104	Bilateral endoscopic destruction or occlusion of fallopian tubes	66.20-66.29	58982-58983
105	Other bilateral destruction or occlusion of fallopian tubes	66.30-66.39	58600-58615
106	Total bilateral salpingectomy	66.50-66.59	a/
107	Conization of cervix	67.20-67.29	57520
108	Other excision or destruction of cervix, uterus, and supporting structures	67.30-67.49 68.20-68.29 69.10-69.19	57510-57513 57530-57556 58140-58145
109	Abdominal hysterectomy	68.30-68.49 68.60-68.69	58150-58239
110	Vaginal hysterectomy	68.50-68.59 68.70-68.79	58260-58285
111	Dilation and curettage to terminate pregnancy	69.01	59840
112	Dilation and curettage of uterus after delivery or abortion	69.02	59160
113	Diagnostic dilation and curettage of uterus	69.00 69.09	57820 58120
114	Aspiration curettage of uterus for termination of pregnancy	69.51	a/
115	Insertion of laminaria	69.93	a/
116	Repair of cystocele and rectocele	70.50-70.59	a/
117	Incision and excision of lesion of vulva	71.00-71.09	53270

	and perineum	71.20-71.49	56400-56515 56680-56685 56740
118	Biopsy and other diagnostic procedures on the female genital organs	65.10-65.19 66.10-66.19 67.10-67.19 68.10-68.19 70.20-70.29 71.10-71.19	56100 56600 57100-57105 57450-57454 57500 58100 58101 58900 58986
119B	Excision or destruction of tissue of vagina or hymen	b/	56700 57050-57063 57135
119	Other operations on the female genital organs	65.00-65.09 65.70-66.09 66.40-66.49 66.60-67.09 67.50-68.09 68.80-68.89 69.20-69.49 69.52-69.92 69.94-70.19 70.30-70.49 70.60-70.99 71.50-71.99	a/
	OBSTETRIC PROCEDURES:		
120	Procedures to assist delivery 1/		
124	Caesarean Section	74.00-74.29 74.40-74.49 74.90 74.99	59500-59581
125	Intraamniotic injection for abortion	75.00-75.09	59850-59852
126	Amniocentesis	75.10-75.19	59000
127	Other intrauterine operation on fetus and amnion 2/	75.30-75.39	59010-59050
130A	Treatment of abortion	b/	59800-59830
130	Other obstetrical procedures	74.30-74.39 74.91 75.20-75.29 75.70-75.99	a/
	OPERATIONS ON THE MUSCULOSKELETAL SYSTEM:		

131	Incision of bone	76.00-76.09 77.00-77.39	21510 22200-22207 23032-23036 23170-23175 23480-23485 23935 24134-24139 25032-25036 25145-25146 25350-25375 26034 26565-26567 26992-26995 27140-27156 27158-27165 27303 27448-27462 27607-27608 27705-27712 28005-28006 28300-28312
132	Reduction of fracture and dislocation of jawbone	76.71-76.77 76.93-76.96	a/
133	Bunionectomy	77.50-77.59	a/
134	Partial excision of bone	76.20-76.39 77.60-77.89	21030-21045 21600 21620 22100-22115 23140-23156 23180-23190 23195 23200-23222 24110-24130 24140-24148 24150-24153 25120-25136 25150-25170 26200-26236 26250-26262 27065-27079 27355-27365 27635-27647 28100-28110 28118-28119 28120-28124 28171-28175
135	Removal of internal bone fixation device	76.97 78.60-78.69	20670-20680
136	Open reduction of fracture	76.79 79.20-79.39 79.50-79.69	21385-21395 21406-21407 21495

			22328-22329
			23515
			23585
			23615
			23630
			24515
			24545
			24575
			24579
			24585-24588
			24635
			24665-24666
			24685
			25515
			25545
			25575
			25620
			25628
			25645
			25685
			26615
			26665
			26735
			26746
			26765
			27181
			27192
			27202
			27214
			27224-27225
			27236
			27244
			27248
			27506
			27514
			27519
			27524
			27536-27537
			27540
			27756-27758
			27766
			27784
			27792
			27806
			27814
			27822-27823
			28415-28420
			28445
			28465
			28485
			28505
			28525
137	Other reduction of fracture	76.70	21301-21309
		76.78	21341-21344
		79.00-79.19	21400-21401

		79.40-79.49	21493-21494
			21800-21825
			23500-23510
			23570-23580
			23600-23610
			23620-23625
			24500-24510
			24530-24542
			24560-24570
			24576-24578
			24580-24583
			24620-24625
			24650-24660
			24670-24680
			25500-25510
			25530-25540
			25560-25570
			25600-25615
			25622-25626
			25630-25640
			25650
			25680
			26600-26610
			26645-26660
			26720-26730
			26740-26744
			26750-26760
			27190-27191
			27200-27201
			27210-27212
			27220-27222
			27230-27235
			27238-27242
			27246
			27500-27504
			27508-27512
			27516-27518
			27520-27522
			27530-27534
			27538
			27750-27754
			27760-27764
			27780-27782
			27786-27790
			27800-27804
			27808-27812
			27816-27820
			28400-28410
			28430-28440
			28450-28460
			28470-28480
			28490-28500
			28510-28520
138	Reduction of dislocation of joint	79.70-79.89	a/

139	Repair and plastic operations on bone (except facial)	78.00-78.59 78.70-78.79 78.90-78.99 79.70-79.99	a/
140	Arthroscopy	80.20-80.29	27373 27850 23355 29815 29830 29870 29890
141	Division of joint capsule, ligament or cartilage	80.40-80.49	a/
142	Excision or destruction of intervertebral disc	80.50-80.59	63020-63076
143	Excision of semilunar cartilage of knee	80.60-80.69	27332 27333 29881
144	Other excision or destruction of lesion of joint	80.80-80.89	a/
145	Spinal fusion	81.00-81.09	22330-22371 22550-22803
146	Arthroplasty of knee	81.41-81.47	a/
147	Arthroplasty and replacement of hip	81.50-81.69	27120-27135
148	Arthroplasty of other joints	81.30-81.39 81.48-81.49 81.70-81.89	a/
149	Operations on muscles, tendons, fascia and bursa	82.00-83.19 83.30-83.99	20000-20010 20500 20520-20610 20913-20926 21295-21296 21501-21509 21511 21556 22031-22033 22900-22910 23000-23020 23030-23031 23076 23110 23331-23332 23395-23397 23405-23440 23930-23934 23936 24076

			24105 24201 24301-24356 24495 25000-25023 25028-25031 25076 25110-25119 25248 25260-25318 26012-26032 26035-26060 26116-26129 26141-26180 26350-26508 26550-26559 26580-26593 26990-26991 27000-27026 27048 27060-27062 27087-27088 27097-27115 27301-27302 27304-27307 27328 27340-27345 27380-27400 27600-27604 27605-27606 27619 27630 27650-27694 28001-28004 28008-28011 28044-28045 28060-28069 28071-28079 28081-28092 28192-28193 28200-28250
150	Amputation of lower limb	84.10-84.19	27290-27295 27590-27598 27880-27889 28800-28825
151A	Amputation of finger	b/	26910-26952
151	Other operations on the musculoskeletal system	76.10-76.19 76.40-76.69 76.91-76.92 76.99 77.40-77.49 77.90-77.99 78.80-78.89	a/

		80.00-80.19 80.30-80.39 80.70-80.79 80.90-80.99 81.10-81.29 81.90-81.99 83.20-83.29 84.00-84.09 84.20-84.99	
	OPERATIONS ON THE INTEGUMENTARY SYSTEM:		
152	Excision or destruction of breast tissue (partial mastectomy)	85.20-85.23	19120-19139 19141-19162
153	Mastectomy	85.40-85.49	a/
154	Incision of skin and subcutaneous tissue	86.00-86.09	10000-10180 11900-11901 23330 24200 26010-26011 27086
155	Excision of pilonidal cyst or sinus	86.21	a/
156	Debridement of wound, infection or burn	86.22	11000-11044 16010-16030 16035
157	Other excision or destruction of lesion of skin and subcutaneous tissue	86.23-86.49	11050-11052 11200-11646 11700-11711 11730-11752 21555 22030 23075 24075 25075 26115 27047 27327 27618 28043 15780-15791 15920-15999 17000-17360
158	Suture of skin and subcutaneous tissue	86.50-86.59	12001-12010 12019-12050
159	Skin graft (except lip or mouth)	86.60-86.79	14000-15776
160	Other repair and reconstruction of skin and subcutaneous tissue	86.80-86.89	a/

161	Biopsies on the integumentary system	85.10-85.19	11100-11101
		86.10-86.19	19100-19101
162	Other operations on the integumentary system	85.00-85.09	16000
		85.24-85.39	17999-19020
		85.50-85.99	19140
		86.90-86.99	19350-19499

a/ Procedure not mapped for CPT-4.
b/ Procedure not mapped for ICD-9-CM.

APPENDIX E

Data Tables for All Procedures

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
ALL	38,825	27,160	2,543	69,057,227	15,495	2,474	38,340,582	23,330	11,665	2,633	30,716,645
123	6,574	5,707	2,279	13,004,844	3,230	2,369	7,652,486	3,344	2,477	2,161	5,352,358
009	1,920	663	2,489	4,139,468	969	2,553	2,474,977	951	694	2,456	1,704,691
122	2,185	1,566	2,266	3,548,721	1,047	2,203	2,306,956	1,138	519	2,393	1,241,765
127	2,774	982	2,000	1,963,517	99	1,951	193,129	2,675	883	2,005	1,770,388
124	800	733	2,313	1,695,160	531	2,199	1,168,094	269	202	2,506	506,166
028	689	670	2,038	1,365,372	513	1,925	987,749	176	157	2,405	377,623
109	595	568	2,357	1,339,030	192	2,162	415,062	403	376	2,457	923,968
013	508	455	2,504	1,243,911	233	2,092	729,342	275	122	2,292	523,569
070	479	457	2,674	1,222,235	204	2,467	503,334	275	253	2,842	718,901
048	389	245	4,460	1,092,686	144	3,917	564,026	245	101	5,234	528,660
105	1,102	488	2,099	1,024,324	335	1,973	661,021	767	153	2,375	363,303
119	709	446	2,260	1,008,181	202	2,153	434,877	507	244	2,350	573,304
060	540	379	2,565	972,273	232	2,350	545,228	308	147	2,905	427,045
043	225	210	4,463	937,136	110	3,199	571,899	115	100	3,652	365,237
072	416	377	2,291	863,806	269	2,277	612,534	147	108	2,928	251,372
129	789	378	2,260	854,361	238	2,156	513,242	551	140	2,437	341,119
149	384	287	2,898	831,691	190	2,748	522,124	194	97	3,191	309,567
186	576	275	2,934	806,820	174	2,567	450,936	402	101	3,524	355,914
112	397	374	1,965	734,782	333	1,949	649,157	64	41	2,088	85,625
010	354	213	3,275	697,487	70	2,950	206,471	284	143	3,434	491,016
080	393	319	2,157	691,417	110	3,009	330,729	283	109	3,350	360,688
006	439	275	2,485	683,318	206	2,437	502,115	233	69	3,626	181,203
136	262	240	2,662	634,190	173	2,483	429,561	89	67	3,054	204,629
082	370	244	2,527	616,727	63	2,365	148,970	307	181	2,960	467,757
075	334	214	2,826	604,788	69	2,526	174,310	265	145	2,969	430,478
151	309	204	2,926	596,993	113	2,736	309,120	196	91	3,163	287,873
113	415	292	1,940	566,417	164	1,770	290,965	251	128	2,723	272,452
007	184	130	4,179	543,310	81	3,850	311,869	103	49	4,723	231,441
002	150	118	4,488	529,557	82	4,905	402,209	68	36	3,537	127,348
079	272	182	2,750	500,518	66	2,588	170,818	206	116	2,864	329,708
073	275	240	1,999	479,840	199	1,978	393,578	76	41	2,104	86,262
001	138	117	3,956	462,879	80	3,910	312,801	58	37	4,056	150,078
027	232	177	2,024	459,467	202	2,005	404,988	30	25	2,179	54,579
030	297	181	2,498	452,093	100	2,630	263,045	197	81	2,334	189,048
004	237	199	2,236	444,956	167	2,201	367,542	70	32	2,419	77,414
076	188	159	2,690	427,114	112	2,652	297,023	76	47	2,761	130,191
164	188	152	2,711	412,091	98	2,574	252,248	90	54	2,960	159,843
121	220	190	2,143	407,180	126	2,064	260,097	94	64	2,298	147,083
162	213	110	3,634	399,759	53	2,772	199,990	70	57	2,506	199,829
131	191	132	2,985	393,970	57	2,916	166,190	134	75	3,500	227,700
163	176	117	3,274	383,112	79	3,466	273,663	97	38	2,880	109,449
108	199	94	3,930	369,402	55	3,609	198,521	54	39	4,382	170,881
015	382	165	2,238	369,244	76	2,388	181,459	306	89	2,506	181,755
008	400	160	2,280	364,723	132	2,231	294,557	268	28	2,506	70,166
156	196	128	2,824	361,448	50	2,379	118,955	146	78	3,109	242,493
035	129	102	3,357	342,453	61	2,999	182,936	68	41	3,522	159,517
098	450	176	1,940	341,442	40	1,919	76,762	410	136	1,946	264,680
110	141	135	2,501	337,622	84	2,404	201,974	57	51	2,660	135,648
102	290	142	2,362	335,456	59	2,137	126,091	231	83	2,522	201,365
150	136	115	2,741	315,236	80	2,630	210,361	56	35	2,996	104,875
137	172	149	2,106	313,813	114	2,087	237,968	58	35	3,167	75,845
134	171	111	2,807	311,546	66	2,501	165,065	105	45	4,255	146,481
076	191	126	2,417	304,482	71	2,226	158,077	120	55	2,662	148,405
042	43	34	6,925	303,444	6	7,987	47,919	37	28	6,126	255,525
120	155	135	2,217	299,270	62	1,996	123,762	93	73	2,404	175,508

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
093	174	107	2,786	298,092	44	2,926	128,755	130	63	2,688	169,337
169	138	83	3,589	297,911	49	3,310	162,198	89	34	5,992	135,713
096	134	108	2,733	295,174	55	2,972	163,476	79	53	2,485	131,698
154	160	137	2,131	291,658	95	2,071	196,723	65	42	2,268	95,262
133	122	101	2,858	288,685	75	2,761	207,055	47	26	3,140	81,630
145	83	59	4,862	286,887	30	4,350	139,499	53	29	5,393	156,388
038	146	94	3,036	285,801	63	2,761	173,969	103	51	2,885	167,532
159	166	88	3,136	275,970	48	2,970	142,560	118	40	3,335	133,410
012	113	100	2,753	275,335	92	2,737	253,607	21	8	2,716	21,728
147	71	69	3,878	267,613	66	3,781	211,718	15	13	4,300	55,895
061	85	67	3,932	263,416	15	3,591	53,862	70	52	4,030	209,554
185	100	90	2,919	262,712	83	2,983	247,604	17	7	2,158	15,108
053	149	108	2,397	258,838	61	2,143	130,728	88	47	2,726	128,110
022	116	95	2,684	254,945	43	2,516	108,177	73	52	2,822	146,768
064	114	103	2,467	254,052	82	2,294	188,091	32	21	3,141	65,961
050	104	71	3,308	234,849	53	3,329	176,467	51	18	3,245	58,402
107	124	98	2,287	224,102	28	2,072	58,023	96	70	2,373	166,079
069	123	106	2,111	223,773	64	2,149	137,528	59	42	2,053	86,245
053	118	66	2,481	222,753	20	2,790	75,971	95	44	3,336	146,782
078	301	93	2,389	222,158	50	2,519	75,583	271	63	2,327	146,575
041	35	28	7,914	221,589	6	6,414	38,484	29	22	8,323	183,105
101	136	99	2,216	219,376	38	2,905	76,196	98	61	2,347	143,180
062	90	64	3,391	217,000	35	3,257	129,731	55	39	3,009	87,269
133	100	83	2,609	216,542	20	2,299	45,989	80	63	2,707	170,553
081	84	64	3,077	196,914	33	2,959	97,654	51	31	3,202	99,260
039	69	50	3,917	195,825	24	3,558	86,760	45	26	2,311	109,475
157	103	71	2,638	187,279	43	2,440	104,935	60	28	2,941	82,344
005	82	63	2,868	180,710	27	3,353	90,535	55	36	2,505	90,175
171	176	91	1,970	179,295	41	1,991	81,655	135	50	1,952	97,620
011	68	36	4,947	178,093	12	4,868	58,415	56	24	4,981	119,678
016	76	61	2,904	177,150	47	2,917	137,087	27	14	2,862	40,063
146	56	45	3,844	172,989	31	3,277	120,066	25	14	3,716	51,993
003	56	38	4,478	170,167	18	4,277	76,977	38	20	4,660	93,190
161	80	63	2,615	164,774	48	2,557	122,736	32	15	2,803	42,038
162	53	45	3,575	160,857	33	3,668	111,545	20	12	3,868	46,412
024	96	81	1,965	159,140	48	1,778	85,750	48	33	2,349	76,990
152	83	72	2,200	158,370	59	2,167	127,833	24	13	3,949	30,337
029	121	74	2,090	154,640	24	2,882	45,178	97	50	2,189	109,462
077	114	63	2,400	151,786	49	2,391	117,135	65	14	4,981	34,911
104	82	70	2,133	149,310	63	2,076	130,778	19	7	2,647	18,532
092	74	49	3,035	148,705	26	3,111	80,876	48	25	2,949	67,831
167	304	61	2,402	146,543	29	2,542	73,722	275	22	2,522	72,821
139	92	47	2,951	138,695	27	3,248	87,694	65	20	2,550	51,001
100	84	51	2,715	138,444	38	2,871	109,095	46	13	2,259	29,369
086	123	49	2,772	135,810	5	2,359	11,793	118	44	2,852	124,017
140	80	48	2,757	132,345	23	2,922	67,206	57	25	2,606	65,139
026	49	44	2,985	131,337	38	2,711	103,024	11	6	4,719	28,313
177	87	44	2,961	130,293	23	2,617	83,190	66	21	2,643	47,103
032	29	20	6,146	122,929	7	4,723	33,061	22	13	6,913	89,868
148	78	39	3,107	121,154	19	3,316	62,995	59	20	2,908	58,159
118	117	52	2,319	120,577	19	2,074	39,413	98	33	5,460	81,164
049	66	46	2,570	118,236	31	2,510	77,816	35	15	2,695	40,420
084	57	40	2,938	117,503	8	3,201	25,608	49	32	2,872	91,895
040	16	14	8,039	112,548	2	5,808	11,616	14	12	8,411	100,932
166	85	32	3,445	110,232	12	3,487	41,845	73	20	3,419	68,387
087	47	39	2,786	108,668	29	2,758	79,983	18	10	2,869	28,685

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
036	52	33	3,190	105,257	17	3,172	53,924	35	16	3,208	51,333
143	61	34	2,993	101,776	10	2,730	27,303	31	24	3,103	74,473
044	31	26	3,897	101,328	15	2,855	42,824	16	11	3,319	58,304
016	40	35	2,854	99,874	18	2,643	47,574	22	17	3,076	52,300
153	43	35	2,847	99,631	21	3,002	63,034	22	14	2,614	36,597
025	88	51	1,947	99,320	18	1,986	35,755	70	33	1,926	63,565
018	50	34	2,854	97,028	27	2,777	74,975	23	7	3,150	22,053
067	29	23	3,306	95,886	23	3,040	69,927	24	6	4,327	25,959
055	35	23	3,976	91,448	16	4,548	72,764	19	7	2,669	18,684
132	37	32	2,696	86,276	24	2,555	61,323	13	8	3,119	24,953
160	51	28	3,067	85,885	14	3,283	45,968	37	14	2,851	39,915
116	87	62	2,036	85,529	28	1,904	53,316	59	14	2,301	32,213
138	35	33	2,259	74,549	29	2,195	63,641	6	4	2,727	10,908
067	36	31	2,404	74,538	21	2,546	53,475	15	10	2,106	21,063
183	55	36	2,044	73,576	29	1,981	57,480	26	7	2,304	16,126
103	152	32	2,293	73,379	10	2,147	21,466	142	22	2,360	51,913
019	41	25	2,933	73,331	6	2,507	15,039	35	19	3,068	58,292
178	22	20	3,657	72,133	14	3,055	42,774	8	6	3,061	30,366
108	49	28	2,495	69,854	9	2,717	24,453	40	19	2,390	45,401
158	60	34	2,005	68,161	27	1,600	43,200	33	7	3,566	24,961
094	17	12	5,664	67,972	6	2,417	14,501	11	6	8,912	53,471
117	41	30	2,261	67,833	21	1,999	41,987	20	9	2,872	25,846
165	35	26	2,534	65,889	16	2,677	42,832	39	10	2,306	23,057
031	38	24	2,711	65,059	6	3,602	21,612	32	18	2,414	43,447
130	43	28	2,272	63,612	19	2,233	42,423	24	9	2,354	21,189
089	41	25	2,533	63,319	10	2,660	26,598	31	15	2,448	36,721
023	49	32	1,958	62,640	13	1,646	21,400	36	19	2,171	41,240
063	46	20	3,049	60,980	13	2,525	32,824	33	7	2,032	28,156
068	31	25	2,400	60,006	14	2,610	36,539	17	11	2,135	23,467
141	38	26	2,486	59,667	10	2,036	20,363	28	14	2,807	39,304
037	33	23	2,546	58,568	13	2,274	29,566	20	10	2,903	29,012
057	26	16	3,621	57,931	4	3,835	15,340	22	12	2,549	42,591
054	21	15	3,816	57,237	10	3,669	36,688	11	5	4,110	20,549
155	23	23	2,210	50,828	21	2,302	48,343	2	2	1,243	2,485
034	11	10	5,079	50,788	2	3,225	6,451	9	8	5,533	44,265
020	66	19	2,866	50,654	5	1,983	9,917	61	14	2,910	40,737
021	24	20	2,348	46,966	10	1,947	19,473	14	10	2,769	27,693
051	19	12	3,835	46,023	6	4,473	26,839	13	6	3,397	19,184
065	24	18	2,455	45,196	8	1,810	14,482	16	10	2,971	29,712
083	24	18	2,817	44,253	4	3,140	12,559	20	11	2,699	29,694
045	20	18	2,301	41,410	16	2,263	36,213	4	2	2,599	5,197
090	23	12	3,402	40,826	8	2,547	20,373	15	4	5,113	20,453
059	25	12	3,181	38,171	1	4,115	4,115	24	11	3,096	34,056
172	34	16	2,302	36,827	11	2,316	25,480	23	5	2,619	11,947
106	43	18	2,020	36,352	8	1,895	15,159	35	10	2,119	21,193
179	53	18	1,972	35,495	15	1,982	28,227	38	3	2,423	7,268
175	20	10	3,240	32,396	6	2,241	13,445	14	4	2,758	10,951
058	20	13	2,441	31,735	1	2,587	2,587	19	12	2,429	29,148
174	23	19	1,640	31,151	17	1,652	28,090	6	2	1,531	3,061
144	23	11	2,224	24,467	6	2,091	12,547	17	5	2,584	11,920
111	10	9	2,487	22,386	7	2,298	16,084	3	2	3,151	6,302
099	11	8	2,110	18,479	5	1,634	8,169	6	3	3,437	10,310
168	19	8	2,027	16,213	5	1,835	9,174	14	3	2,346	7,039
114	9	8	1,924	15,396	5	1,807	9,037	4	3	2,119	6,357
182	16	8	1,778	14,225	3	1,333	3,998	13	5	2,045	10,227
128	22	7	1,980	13,662	.	.	.	22	7	1,980	13,862

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
056	4	4	3,368	13,471	4	3,368	13,471	.	.	.	.
066	5	5	2,663	13,316	1	1,697	1,697	5	4	2,905	11,619
184	10	7	1,681	11,765	5	1,738	8,688	5	2	1,539	3,077
126	5	4	1,921	7,685	2	2,007	4,014	3	2	1,836	3,671
088	15	4	1,911	7,644	1	2,146	2,146	14	3	1,833	5,498
180	8	2	3,741	7,481	1	4,142	4,142	7	1	3,339	3,339
052	3	2	3,665	7,329	2	3,665	7,329	1	0	.	0
181	4	3	2,317	6,952	2	2,378	4,756	2	1	2,196	2,196
085	9	2	3,264	6,527	.	.	.	9	2	3,264	6,527
170	91	2	2,703	5,405	.	.	.	91	2	2,703	5,405
091	6	3	1,709	5,127	2	1,555	3,109	4	1	2,018	2,018
173	3	3	1,059	3,176	2	1,103	2,206	1	1	970	970
071	11	1	2,398	2,398	.	.	.	11	1	2,398	2,398
115	2	1	1,851	1,851	.	.	.	2	1	1,851	1,851
095	1	0	.	0	.	.	.	1	0	.	0
097	3	0	.	0	.	.	.	3	0	.	0
176	1	0	.	0	.	.	.	1	0	.	0

ALL STAYS

RE-CODE	VOLUME ALL	VOLUME PRINCIPAL	MEAN COST	AGGREGATE COST
ALL	66,364	50,000	4,365	218,248,426
186	2,199	1,158	21,379	24,756,316
124	5,903	5,891	3,844	22,642,644
048	1,720	1,195	9,235	11,035,666
122	4,942	3,976	1,980	9,787,151
123	3,795	2,964	3,175	6,446,671
070	1,468	1,412	3,962	5,594,030
080	1,387	737	3,232	5,329,812
060	1,225	946	4,633	4,382,875
109	1,142	1,097	3,537	3,924,319
119	2,013	1,465	1,923	3,845,170
075	891	422	3,682	3,241,926
001	292	235	13,006	3,055,874
136	710	634	4,610	2,922,697
032	86	65	44,576	2,897,642
061	293	238	11,598	2,594,030
064	1,063	964	2,788	2,760,363
046	277	244	10,708	2,612,772
151	650	505	5,138	2,605,005
129	1,840	1,211	2,057	2,590,688
156	435	276	8,815	2,432,932
159	368	344	6,909	2,417,751
041	164	144	16,716	2,407,512
039	222	167	14,465	2,365,533
002	268	215	10,576	2,273,846
112	1,622	1,535	1,478	2,268,724
063	547	491	4,532	2,225,100
105	1,513	891	2,407	2,144,847
007	225	169	12,409	2,097,139
035	299	200	10,482	2,096,385
038	348	266	7,458	1,983,936
079	515	357	5,491	1,957,682
149	768	566	3,002	1,698,902
113	857	620	2,735	1,695,887
120	786	750	2,242	1,681,423
150	193	165	9,917	1,636,729
154	379	327	4,939	1,615,107
072	720	652	2,368	1,564,241
082	595	368	4,061	1,496,307
093	375	299	4,932	1,474,793
042	131	109	13,030	1,420,292
036	183	111	11,580	1,420,607
013	489	373	3,281	1,225,756
098	1,165	665	1,822	1,211,334
040	75	59	20,067	1,185,277
102	364	340	3,248	1,182,719
077	286	178	6,127	1,090,552
062	242	164	6,551	1,087,392
142	271	259	4,186	1,084,154
076	643	308	3,497	1,069,098
078	553	204	5,191	1,031,272
137	343	303	3,468	1,050,666
030	402	281	3,698	1,038,999
050	206	146	7,064	1,031,272
157	314	204	4,696	957,941
101	414	301	3,129	941,694

1 PROCEDURE STAYS

VOLUME PRINCIPAL	MEAN COST	AGGREGATE COST
33,636	3,559	119,701,724
4,719	3,916	1,453,013
3,871	4,703	18,267,878
769	6,078	6,212,164
2,833	1,941	5,498,562
1,803	2,110	3,804,136
891	3,663	3,263,730
381	5,955	2,268,765
732	4,253	3,112,985
432	3,727	1,609,910
989	2,436	2,428,997
154	7,460	1,148,825
141	13,012	1,834,713
454	4,335	1,968,306
42	51,696	2,171,223
84	11,436	960,658
847	2,614	2,213,807
153	6,254	1,180,086
334	4,634	1,547,824
762	1,971	1,501,882
162	8,339	1,350,854
140	9,712	1,359,654
57	16,533	942,399
98	15,061	1,515,185
155	7,585	1,175,552
1,418	1,427	2,022,849
244	4,401	1,073,838
740	2,437	1,803,631
106	8,137	862,512
319	9,739	1,158,993
151	7,405	1,119,157
183	5,128	938,378
341	2,904	990,212
365	2,177	794,556
506	2,201	1,113,634
105	8,182	859,121
272	4,152	1,238,833
473	2,117	1,001,134
204	3,640	742,492
156	5,338	832,756
30	10,571	317,121
68	9,692	591,033
260	2,278	592,307
652	1,815	1,183,777
25	17,957	413,016
130	5,152	669,782
106	5,400	572,453
78	6,113	476,809
202	3,922	791,800
184	3,090	568,587
66	4,508	288,535
259	3,245	840,337
194	3,184	617,660
92	6,636	610,470
159	3,824	573,655
110	2,882	316,992

2 PROCEDURE STAYS

VOLUME ALL	VOLUME PRINCIPAL	MEAN COST	AGGREGATE COST
32,728	16,364	6,022	98,546,702
1,828	787	29,610	23,303,303
1,184	1,172	3,933	4,655,744
951	426	11,323	4,823,502
2,109	1,143	5,302	2,373,589
1,992	1,161	2,276	2,642,535
577	321	4,473	2,330,300
1,006	356	5,950	3,061,047
491	214	5,934	1,269,888
710	695	3,480	2,514,409
1,024	476	5,971	2,414,173
537	268	7,810	2,093,101
151	94	12,991	1,221,161
256	180	5,302	954,391
44	23	31,575	726,219
209	154	11,687	1,799,755
216	117	4,055	474,059
124	91	12,442	1,134,686
316	171	6,182	1,059,181
1,078	449	2,202	988,806
273	114	9,295	1,082,078
228	104	10,174	1,056,097
107	87	16,836	1,466,713
124	69	12,450	850,648
113	60	18,302	1,098,143
204	111	2,098	245,475
303	247	4,276	1,151,262
773	151	2,260	341,216
119	63	19,597	1,234,627
180	81	11,572	933,232
197	115	7,529	865,779
332	174	5,873	1,921,884
427	225	3,150	708,690
492	255	3,534	901,131
280	244	2,327	567,789
88	60	12,252	777,928
107	55	6,853	376,924
247	179	3,034	543,107
391	164	4,784	751,815
219	143	4,490	642,057
101	79	13,966	1,103,171
115	43	16,198	694,374
229	113	3,287	371,649
513	13	2,151	27,957
52	36	21,216	770,959
434	210	3,307	994,515
180	72	7,196	518,117
164	66	9,251	610,583
69	57	5,129	292,354
459	124	4,036	500,511
489	140	5,503	770,384
86	44	4,780	210,327
208	87	4,843	421,339
114	54	7,793	420,802
164	54	7,116	384,286
304	191	3,271	624,702

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
145	98	77	12,198	939,231	45	11,970	538,632	53	32	12,519	400,599
053	318	232	3,801	881,787	182	3,490	635,139	136	50	4,933	246,648
169	251	176	5,006	881,055	131	4,750	622,295	20	45	7,750	238,760
081	135	110	7,822	860,437	64	6,847	438,220	71	46	9,179	422,217
147	106	102	8,416	858,865	87	8,553	726,625	19	15	8,786	131,790
074	266	225	3,830	854,148	167	2,753	459,728	97	56	7,043	394,420
010	405	282	5,912	838,083	149	2,841	423,274	256	133	3,119	414,809
004	317	267	5,104	828,770	229	2,847	652,064	88	38	4,650	176,706
063	122	56	14,106	789,958	26	15,368	321,572	96	30	15,913	468,386
028	686	676	1,162	785,676	529	1,145	605,615	160	147	1,225	180,059
057	66	57	13,136	748,739	24	14,268	342,435	42	33	12,312	406,304
034	61	54	13,850	747,907	24	17,131	411,137	37	30	11,256	336,770
125	699	699	1,060	741,164	594	984	584,255	105	105	1,494	156,909
127	1,003	524	1,395	730,805	201	974	195,811	802	323	1,656	534,994
003	109	85	8,538	725,695	56	7,694	430,856	53	29	10,167	294,839
033	194	114	6,259	713,503	58	8,016	464,946	136	56	4,439	248,629
044	92	68	10,482	712,770	69	11,376	557,430	43	19	8,176	155,340
049	163	100	6,616	661,603	67	4,932	330,442	76	33	10,015	331,161
131	227	155	4,181	648,116	86	4,172	358,776	141	69	4,193	289,360
153	140	127	4,944	627,926	95	4,282	406,025	45	32	7,059	225,901
055	80	46	13,368	614,918	33	14,545	470,078	47	13	11,142	144,840
146	131	112	5,259	593,511	69	6,159	426,962	62	43	3,920	168,549
171	424	254	2,333	592,646	202	2,163	449,855	216	46	3,104	142,791
133	275	249	2,331	580,302	135	2,188	295,515	140	116	5,500	284,987
110	181	180	3,182	572,702	108	3,135	338,586	73	72	7,252	262,116
175	76	40	13,878	555,134	25	14,075	351,876	51	15	13,551	203,258
134	247	161	3,396	546,750	111	2,851	316,448	136	50	4,606	230,302
139	207	121	4,107	496,916	80	3,511	280,870	127	41	5,269	216,046
059	42	21	21,859	459,029	5	21,079	105,397	37	16	22,102	353,635
121	237	190	2,321	440,978	109	2,208	240,627	128	81	2,473	200,351
051	59	47	9,053	425,503	25	10,569	264,234	34	22	4,611	161,369
009	105	91	4,636	421,899	75	4,444	333,312	30	16	5,537	88,587
161	146	106	3,881	411,341	73	3,469	269,911	71	31	4,875	151,130
094	74	64	6,186	395,909	40	4,941	197,625	34	24	8,241	198,284
166	141	86	4,595	395,184	58	4,201	243,676	83	28	5,411	151,508
114	241	238	1,652	393,161	208	1,443	300,226	33	30	3,101	93,035
132	138	120	3,235	388,145	96	3,046	292,456	42	24	3,987	95,689
092	176	149	2,600	387,423	92	2,524	232,220	84	57	2,723	155,203
135	139	113	3,246	366,847	81	2,403	194,647	58	32	5,381	172,200
096	211	172	2,078	357,338	101	2,183	220,489	110	77	2,717	136,849
006	217	133	2,573	342,173	80	2,598	207,856	137	53	2,534	134,317
073	137	116	2,880	334,130	93	1,939	180,335	46	23	6,687	153,795
187	187	161	2,074	333,862	117	2,062	241,296	70	44	2,414	92,566
026	158	142	2,348	333,472	97	2,307	223,819	61	45	2,437	109,653
037	60	42	7,876	330,528	29	5,994	173,823	31	13	12,076	156,989
018	388	89	3,675	327,051	39	3,305	128,902	349	50	3,963	198,149
022	173	129	2,509	323,657	95	2,415	229,429	78	34	3,771	94,228
069	203	164	1,973	323,518	98	2,070	202,904	105	66	1,827	120,614
011	176	160	2,005	320,752	108	1,920	207,372	68	52	2,180	113,380
100	119	83	3,843	318,942	45	3,697	166,387	74	38	4,015	152,555
087	295	150	2,123	318,393	93	2,020	187,845	202	57	2,290	130,548
089	127	99	3,142	311,072	56	2,981	166,938	71	48	3,352	144,134
184	96	88	4,544	308,973	33	4,879	161,010	63	35	4,228	147,963
008	37	25	12,119	302,981	15	14,559	218,387	22	10	8,459	84,594
177	99	94	3,202	300,964	83	3,041	252,498	16	11	4,415	48,566
	131	79	3,756	296,760	49	3,497	171,357	82	30	4,180	125,403

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
167	432	96	3,078	295,480	68	2,769	188,297	364	28	3,828	107,183
027	258	257	1,144	294,069	242	1,117	270,418	16	15	1,577	23,651
058	62	48	6,003	288,121	19	6,948	132,018	43	29	5,383	156,103
162	120	91	3,051	277,613	69	2,879	198,658	31	22	3,589	78,955
181	39	24	11,427	274,236	18	9,172	165,087	21	6	11,702	109,149
148	156	105	2,509	263,484	84	2,451	205,854	72	21	2,774	57,530
152	101	82	3,182	260,954	63	2,940	185,261	38	19	3,985	75,713
138	90	80	3,133	250,674	55	2,918	160,497	35	25	3,607	90,177
012	162	151	1,647	248,706	136	1,620	220,378	26	15	1,889	28,328
116	162	93	2,602	241,990	55	2,468	135,617	107	38	2,536	96,373
056	106	105	2,282	239,609	100	2,227	222,727	6	5	3,376	16,882
174	70	57	3,987	267,287	38	4,121	156,604	32	19	3,720	70,683
160	99	68	3,308	224,956	36	3,033	109,183	63	32	3,618	115,773
158	140	82	2,672	219,072	58	2,071	120,101	82	24	4,124	98,971
083	56	48	4,376	209,964	26	4,669	121,384	30	22	4,026	88,580
164	107	79	2,629	207,680	66	2,295	146,892	63	15	4,053	60,788
016	81	61	3,335	203,457	28	3,331	93,275	53	33	3,339	110,182
108	100	59	3,406	200,979	22	2,925	64,341	78	37	3,693	136,638
090	45	37	5,333	197,316	52	4,869	107,128	23	15	6,013	90,188
180	54	35	5,324	186,331	31	2,666	82,656	23	4	25,919	103,675
066	27	25	7,722	185,326	14	8,294	116,113	13	10	6,921	69,213
179	131	57	3,137	178,789	53	3,107	164,659	78	4	3,533	14,130
031	67	55	3,145	172,975	14	2,294	32,113	53	41	3,436	140,862
086	97	47	3,551	166,906	13	4,988	64,846	84	34	3,002	102,060
128	153	71	2,290	162,610	33	2,369	78,187	120	38	2,225	84,623
141	75	57	2,846	162,203	40	3,210	122,811	35	17	2,317	39,392
118	103	47	3,425	160,996	20	2,672	95,449	83	27	2,503	67,547
117	91	73	2,169	158,353	62	2,053	127,274	29	11	2,825	31,079
045	67	62	2,347	157,893	56	2,355	131,887	11	6	4,334	26,006
015	257	71	2,171	154,151	53	2,486	131,782	204	18	1,243	22,369
140	78	40	3,565	142,580	22	4,225	92,953	56	18	2,277	49,267
111	62	56	2,537	142,054	64	2,380	106,713	18	12	3,112	37,341
178	56	50	2,828	141,378	39	2,780	109,403	17	11	2,998	32,975
163	89	61	2,277	138,882	36	2,012	72,448	53	25	2,666	66,486
155	70	70	1,969	137,800	64	1,903	122,370	6	6	2,572	15,430
106	110	50	2,610	130,509	28	2,533	70,931	82	22	2,708	59,578
047	21	18	7,214	129,852	16	7,618	121,890	5	5	2,781	7,902
130	119	50	2,476	123,793	50	2,604	78,115	89	20	2,284	45,678
084	44	39	3,118	121,601	25	5,705	67,619	19	14	2,856	55,982
067	58	48	5,448	117,525	41	2,397	98,259	9	7	2,962	19,866
019	60	56	2,004	112,206	20	1,692	33,830	40	36	2,177	78,376
183	85	71	1,563	110,938	47	1,455	68,371	38	24	2,774	42,567
185	54	40	2,565	102,599	36	2,623	94,413	18	4	2,774	8,186
020	92	29	3,362	97,900	12	5,114	61,370	80	17	2,125	36,130
065	58	39	2,244	87,521	24	2,007	48,158	35	15	2,624	39,363
144	32	24	3,587	86,083	15	3,432	51,473	17	9	2,694	15,540
024	48	32	2,625	84,004	25	2,647	50,292	29	13	2,593	33,712
165	52	38	2,132	81,016	31	1,615	56,623	21	7	4,424	30,965
068	56	45	1,780	80,102	28	1,725	48,295	28	17	1,871	31,807
107	69	44	1,778	78,249	16	1,890	30,243	53	28	1,715	48,006
023	30	22	3,426	75,363	14	4,045	56,623	16	8	2,343	18,740
021	30	26	3,017	72,413	15	2,945	44,181	15	9	3,137	28,236
126	43	22	3,098	68,153	17	1,767	30,036	26	5	2,623	38,117
143	36	28	2,350	65,790	18	2,467	44,401	18	10	2,139	23,389
091	107	13	4,866	63,258	10	5,409	54,093	97	3	3,055	9,165
005	29	22	2,857	62,853	19	2,762	52,472	10	3	3,460	10,381

MICHIGAN INPATIENT

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
029	51	45	1,361	61,257	23	1,380	31,733	28	22	1,342	29,524
172	49	27	2,145	57,926	23	1,516	34,867	26	4	5,765	23,059
088	25	8	7,181	57,444	4	5,430	21,718	21	4	8,932	35,726
104	63	35	1,616	56,560	25	1,557	35,814	40	12	1,729	20,746
099	25	18	3,071	55,276	10	2,550	25,502	15	8	3,722	29,774
054	19	11	4,776	52,539	6	2,504	15,021	13	5	7,584	37,518
071	43	6	7,830	46,982	1	6,971	6,971	42	5	8,002	40,011
170	241	16	2,903	46,449	14	2,519	35,260	227	2	5,595	11,189
176	24	9	2,641	23,768	9	2,641	23,768	15	0	.	0
052	10	8	2,713	21,703	6	2,204	13,223	4	2	4,240	8,480
168	13	9	2,290	20,606	8	2,126	17,010	5	1	3,596	3,596
095	21	8	2,328	18,622	3	1,328	3,983	18	5	2,928	14,639
085	10	5	3,630	18,149	1	1,400	1,400	9	4	4,187	16,749
182	24	6	2,583	15,496	4	3,139	12,555	20	2	1,471	2,941
025	14	6	1,437	8,621	2	789	1,578	12	4	1,761	7,043
115	96	5	969	4,847	5	969	4,847	89	0	.	0
097	2	1	888	888	1	888	888	1	0	.	0

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
ALL	18,873	18,656	2,137	39,867,219	18,439	2,126	39,203,484	434	217	3,059	663,735
120	8,661	8,643	1,478	12,771,040	8,556	1,474	12,609,773	105	87	1,854	161,267
124	2,068	2,063	3,061	6,315,426	2,041	3,057	6,239,399	27	22	3,456	76,027
109	451	448	3,660	1,639,782	441	3,667	1,616,996	10	7	3,255	22,786
070	421	421	3,840	1,616,696	420	3,829	1,608,181	1	1	8,515	8,515
105	896	821	1,867	1,532,842	808	1,866	1,507,609	86	13	1,941	25,233
136	275	273	3,501	955,842	269	3,394	912,940	6	4	10,726	42,902
122	618	597	1,515	904,181	574	1,509	866,319	44	23	1,646	37,862
075	176	173	4,064	703,036	167	3,997	667,503	9	6	5,922	35,533
028	675	675	988	667,028	672	986	662,391	3	3	1,546	4,637
102	193	190	3,241	615,806	189	3,239	612,243	4	1	3,563	3,563
064	262	259	2,308	597,858	258	2,271	585,962	4	1	11,896	11,896
001	76	74	7,638	565,223	71	7,741	549,602	5	3	5,207	15,621
127	311	298	1,859	553,928	296	1,848	546,870	15	2	3,529	7,058
149	220	218	2,400	523,274	218	2,400	523,274	2	0	.	0
072	284	284	1,632	463,412	283	1,633	462,219	1	1	1,193	1,193
035	132	132	3,220	425,038	129	3,106	400,673	3	3	8,122	24,365
137	138	138	3,037	419,076	136	3,007	408,891	2	2	5,093	10,185
010	171	170	2,237	380,361	169	2,224	375,827	2	1	4,534	4,534
156	79	78	4,621	360,620	77	4,578	352,539	2	1	7,881	7,881
046	68	67	5,033	337,215	66	5,051	333,369	2	1	3,846	3,846
042	44	44	7,638	336,086	44	7,638	336,086	.	.	.	.
113	237	236	1,348	318,021	234	1,323	309,643	3	2	4,189	8,378
159	82	82	3,823	313,525	81	3,756	304,251	1	1	9,274	9,274
002	49	49	6,063	297,093	48	5,777	277,286	1	1	19,807	19,807
157	105	105	2,705	292,467	105	2,785	292,467	.	.	.	.
041	36	36	8,115	292,137	35	8,113	283,957	1	1	8,180	8,180
110	104	103	2,812	289,665	103	2,812	289,665	1	0	.	0
027	276	276	998	275,534	276	998	275,534	.	.	.	.
061	45	45	5,922	266,477	45	5,922	266,477	.	.	.	.
060	116	113	2,316	261,666	111	2,283	253,448	5	2	4,108	8,216
074	91	91	2,861	260,270	91	2,861	260,270	.	.	.	.
098	155	152	1,693	257,389	147	1,658	243,714	8	5	2,735	13,675
142	54	54	4,427	239,068	53	4,458	236,263	1	1	2,805	2,805
154	79	79	2,759	217,965	78	2,745	214,087	1	1	3,878	3,878
131	54	54	3,898	210,513	54	3,898	210,513	.	.	.	.
006	95	95	2,212	210,125	94	2,210	207,711	1	1	2,414	2,414
038	62	62	3,173	196,746	60	3,171	190,244	2	2	3,251	6,502
147	33	33	5,915	195,181	33	5,915	195,181	.	.	.	.
073	107	107	1,819	194,673	107	1,819	194,673	.	.	.	.
150	42	41	4,679	191,855	40	4,559	182,369	2	1	9,486	9,486
101	67	67	2,698	180,759	67	2,698	180,759	.	.	.	.
032	18	17	9,397	159,748	15	8,927	133,901	3	2	12,924	25,847
040	16	16	9,861	157,769	16	9,861	157,769	.	.	.	.
008	55	55	2,861	157,352	55	2,861	157,352	.	.	.	.
036	32	32	4,680	149,768	31	4,739	146,901	1	1	2,867	2,867
043	68	62	3,439	144,436	60	3,519	140,773	2	2	1,832	3,663
134	53	53	2,536	134,433	53	2,536	134,433	.	.	.	.
004	38	38	3,488	132,551	37	3,514	130,015	1	1	2,536	2,536
079	47	47	2,697	126,740	46	2,745	126,266	1	1	474	474
135	56	56	2,129	119,237	56	2,129	119,237	.	.	.	.
050	52	52	3,464	110,848	52	3,464	110,848	.	.	.	.
076	53	52	2,016	104,848	49	1,971	96,603	4	3	2,748	8,245
096	55	55	1,796	98,764	55	1,796	98,764	.	.	.	.
081	20	20	4,578	91,556	20	4,578	91,556	.	.	.	.
164	21	21	3,933	82,584	21	3,933	82,584	.	.	.	.

RE-CODE	ALL STAYS VOLUME ALL	ALL STAYS VOLUME PRINCIPAL	ALL STAYS MEAN COST	ALL STAYS AGGREGATE COST	1 PROCEDURE STAYS VOLUME PRINCIPAL	1 PROCEDURE STAYS MEAN COST	1 PROCEDURE STAYS AGGREGATE COST	2 PROCEDURE STAYS VOLUME ALL	2 PROCEDURE STAYS VOLUME PRINCIPAL	2 PROCEDURE STAYS MEAN COST	2 PROCEDURE STAYS AGGREGATE COST
145	10	10	6,730	67,302	8	6,932	55,457	2	2	5,923	11,845
082	25	25	2,646	66,149	24	2,718	65,233	1	1	916	916
078	20	18	3,073	55,314	17	3,111	52,882	3	1	2,432	2,432
077	17	16	3,392	54,274	15	3,368	50,519	2	1	3,755	3,755
062	7	7	6,633	46,436	7	6,633	46,436	.	.	.	.
169	14	13	3,328	43,265	13	3,328	43,265	1	0	.	0
112	30	30	1,253	37,592	28	1,213	33,956	2	2	1,818	3,636
163	10	9	3,144	28,296	9	3,144	28,296	1	0	.	0
015	36	34	801	27,219	34	801	27,219	2	0	.	0
053	12	12	2,162	25,945	12	2,162	25,945	.	.	.	.

NATIONAL HOSPITAL DISCHARGE SURVEY

VOLUME OF DISCHARGES AGE < 65

RE-CODE	ALL STAYS		ONE PROCEDURE STAYS	2 PROCEDURE STAYS	
	ALL	PRINCIPAL		ALL	PRINCIPAL
ALL	23,330,296	16,656,894	9,983,492	13,346,804	6,673,402
001	48,574	40,862	16,770	31,604	24,092
002	25,181	20,532	12,345	12,836	8,187
003	68,569	66,865	35,527	33,042	31,338
004	210,781	153,940	111,215	99,546	42,725
005	69,429	61,768	29,838	39,591	31,930
006	141,353	95,184	64,752	76,601	30,432
007	78,966	53,532	26,935	52,031	26,597
008	57,383	51,866	17,957	19,426	13,909
009	30,948	23,022	12,470	18,478	10,552
010	172,592	96,750	17,605	154,977	79,145
011	22,077	16,527	7,662	14,415	8,865
012	28,478	25,316	22,313	6,165	3,003
013	166,453	112,981	68,548	97,905	44,433
014	44,803	36,139	24,560	20,243	11,579
015	130,511	61,897	40,495	90,016	21,402
016	23,875	17,402	7,148	16,727	10,254
017	12,016	2,805	1,163	10,853	1,642
018	65,892	39,840	26,369	39,523	13,471
019	41,446	26,794	6,675	34,771	20,119
020	81,768	21,440	6,132	75,636	15,308
021	35,108	26,742	11,146	23,962	15,596
022	201,156	150,971	52,981	148,175	97,990
023	35,420	25,081	14,303	21,117	10,778
024	40,498	33,187	23,944	16,554	9,243
025	13,703	11,220	7,280	6,423	3,940
026	29,751	20,692	11,357	18,394	9,335
027	143,037	139,223	126,052	16,985	13,171
028	201,884	194,016	136,603	65,281	57,413
029	32,161	25,865	6,013	26,148	19,852
030	209,413	124,820	65,676	143,737	59,144
031	15,847	15,109	505	15,342	14,604
032	29,526	16,985	3,591	19,935	13,394
033	52,093	27,532	8,858	42,235	17,674
034	19,433	18,365	3,680	15,753	14,683
035	92,789	62,137	42,773	50,016	19,364
036	87,188	71,161	38,438	48,750	32,723
037	39,080	33,743	10,206	28,874	23,537
038	92,332	46,054	27,342	64,990	18,712
039	51,181	36,096	9,492	41,689	26,604
040	24,335	20,773	8,283	16,052	12,490
041	127,252	113,449	33,457	93,795	79,992
042	51,507	44,232	16,180	35,327	28,352
043	350,407	281,595	111,688	238,719	169,908
044	37,062	30,962	16,184	20,878	14,778
045	41,891	40,119	33,035	8,856	7,382
046	56,677	47,272	20,312	36,365	26,960
047	53,765	38,201	23,345	30,423	14,859
048	360,053	261,706	92,728	267,725	169,378
049	49,551	33,794	17,826	31,725	15,968
050	88,505	52,106	30,459	58,046	21,647
051	18,238	13,623	5,081	13,157	10,542
052	6,140	4,033	1,301	4,749	2,642
053	108,711	75,584	42,849	65,862	32,735
054	13,744	13,610	4,119	9,625	9,491

VOLUME OF DISCHARGES AGE < 65

RE-CODE	ALL STAYS		ONE PROCEDURE STAYS	2 PROCEDURE STAYS	
	ALL	PRINCIPAL		ALL	PRINCIPAL
055	14,790	8,255	3,660	11,330	4,795
056	9,650	9,650	8,546	1,104	1,104
057	16,813	12,227	3,496	13,317	8,731
058	30,714	26,826	3,012	27,702	23,814
059	18,138	10,990	671	17,467	10,319
060	521,661	345,985	208,004	313,657	137,981
061	83,263	65,391	19,853	63,410	45,538
062	53,707	32,128	12,980	40,727	19,148
063	27,021	11,934	4,404	22,617	7,530
064	270,212	263,369	238,818	31,394	24,531
065	43,365	28,691	6,399	36,963	22,292
066	10,296	6,014	2,249	8,047	3,765
067	16,753	15,326	10,632	6,321	4,894
068	25,664	19,377	8,263	17,401	11,114
069	98,287	85,589	40,497	57,790	45,092
070	331,013	322,094	100,670	230,343	221,424
071	18,596	1,897	231	18,365	1,666
072	325,944	310,159	241,194	84,750	68,965
073	45,365	35,826	22,083	23,282	13,743
074	81,024	68,515	44,121	35,903	22,795
075	51,098	44,258	13,208	37,890	31,050
076	215,023	57,245	48,903	166,120	8,342
077	80,703	56,944	18,915	61,788	38,029
078	163,282	90,948	12,888	150,394	78,060
079	121,756	29,049	8,474	113,282	20,575
080	388,942	187,038	74,619	314,323	112,419
081	48,559	40,061	15,087	33,472	24,974
082	293,027	84,430	50,586	242,441	33,844
083	29,232	27,631	9,541	19,691	18,090
084	33,431	32,824	5,035	28,396	27,789
085	10,003	7,609	1,310	8,693	6,299
086	81,402	70,618	2,265	79,137	68,353
087	23,456	14,843	7,096	16,360	7,747
088	15,251	13,589	682	14,569	12,907
089	31,307	11,485	6,576	24,731	4,909
090	10,681	6,898	1,997	8,684	4,901
091	29,654	19,395	4,913	24,741	14,482
092	32,510	25,814	10,037	22,473	15,777
093	142,570	118,921	24,641	117,929	94,280
094	76,221	71,803	23,626	52,595	48,177
095	35,984	15,643	9,295	26,689	6,348
096	44,559	34,016	17,989	26,570	16,027
097	7,982	3,059	1,675	6,307	1,384
098	1,302,608	1,275,911	1,270,094	32,514	5,817
099	29,286	4,536	1,771	27,515	2,665
100	112,090	74,584	39,628	72,462	34,956
101	81,007	52,558	13,750	67,257	38,808
102	150,572	63,043	20,599	129,973	42,444
103	234,584	22,432	7,753	226,831	14,679
104	72,682	52,730	38,686	33,996	14,044
105	380,189	206,465	113,455	266,734	93,010
106	17,300	6,005	1,582	15,718	4,423
107	39,828	25,757	7,778	32,050	17,979
108	79,620	68,162	14,860	64,760	53,302
109	444,099	408,017	59,462	384,637	348,555

VOLUME OF DISCHARGES AGE < 65

RE-CODE	ALL STAYS		ONE PROCEDURE STAYS	2 PROCEDURE STAYS	
	ALL	PRINCIPAL		ALL	PRINCIPAL
110	143,983	133,021	45,302	98,681	87,719
111	23,573	20,887	16,671	6,902	4,216
112	245,317	233,663	201,855	41,462	31,808
113	399,076	346,069	136,022	263,054	210,047
114	43,308	40,870	33,683	9,625	7,187
115	4,190	3,856	853	3,337	3,003
116	99,639	32,417	19,244	80,395	13,173
117	46,333	36,256	24,693	21,640	11,563
118	77,136	8,039	4,889	72,247	3,150
119	289,391	201,065	88,519	200,872	112,546
120	334,820	318,518	217,775	117,045	100,743
121	137,385	117,530	56,738	80,647	60,792
122	1,475,209	1,083,206	1,066,965	408,244	16,241
123	355,114	283,549	64,888	290,226	218,661
124	810,041	803,300	586,898	223,143	216,402
125	10,041	9,478	7,258	2,783	2,220
126	15,822	7,806	5,538	10,284	2,268
127	96,536	29,121	23,019	73,517	6,102
128	24,541	16,234	4,427	20,114	11,807
129	447,635	351,131	172,594	275,041	178,537
130	13,331	9,193	1,822	11,509	7,371
131	89,935	49,434	15,961	73,974	33,473
132	46,011	42,870	24,724	21,287	18,146
133	130,532	120,705	39,945	90,587	80,760
134	161,054	94,006	38,957	122,097	55,049
135	72,527	64,269	44,675	27,852	19,594
136	247,688	218,301	141,993	105,695	76,308
137	158,520	133,519	111,256	47,266	22,263
138	36,248	33,067	24,347	11,901	8,720
139	73,849	36,571	23,240	50,609	13,331
140	214,823	185,296	36,523	178,300	148,773
141	36,554	14,361	9,304	27,250	7,057
142	186,801	182,843	86,531	100,270	96,312
143	105,190	29,944	9,881	95,309	20,063
144	33,394	11,861	4,546	28,848	7,315
145	59,777	35,322	22,243	37,534	13,079
146	86,715	56,940	28,955	57,760	27,985
147	42,156	39,669	32,248	9,908	7,421
148	125,346	76,407	47,026	78,320	29,381
149	260,649	161,096	87,984	172,665	73,112
150	36,514	28,421	16,968	19,546	11,453
151	262,802	173,055	98,605	164,197	74,450
152	82,053	75,748	45,191	36,861	30,557
153	66,916	65,664	33,960	30,956	28,704
154	122,391	105,123	67,024	55,367	38,099
155	31,535	30,078	29,451	2,084	1,427
156	149,477	112,515	25,816	123,661	86,697
157	212,211	147,101	79,570	132,641	67,531
158	125,591	75,792	49,505	76,086	26,287
159	82,060	36,761	23,498	58,562	13,263
160	70,821	40,939	13,224	57,597	27,715
161	117,897	58,627	50,836	67,061	7,791
162	96,649	71,191	43,060	53,589	28,131
163	460,879	274,048	168,026	292,853	106,022
164	337,301	221,053	168,642	168,659	52,411

NATIONAL HOSPITAL DISCHARGE SURVEY

VOLUME OF DISCHARGES AGE < 65

RE-CODE	ALL STAYS		ONE PROCEDURE STAYS	2 PROCEDURE STAYS	
	ALL	PRINCIPAL		ALL	PRINCIPAL
165	129,038	84,933	62,655	66,383	22,278
166	92,004	37,593	28,293	63,711	9,300
167	349,195	103,606	51,965	297,230	51,641
168	6,288	2,773	2,440	3,848	333
169	176,449	99,347	64,458	111,991	34,889
170	226,815	39,079	16,544	210,271	22,535
171	392,875	245,452	165,809	227,066	79,643
172	103,964	56,427	31,934	72,030	24,493
173	39,830	27,473	18,166	21,664	9,307
174	72,999	49,674	33,565	39,434	16,109
175	43,643	19,419	10,298	33,345	9,121
176	72,216	49,226	29,821	42,395	19,405
177	263,946	142,706	78,951	185,015	63,775
178	38,573	24,596	17,876	20,697	6,720
179	57,690	28,924	25,460	32,230	3,464
180	16,561	9,319	7,695	14,066	3,824
181	20,015	13,014	9,014	11,001	4,000
182	12,155	2,099	1,664	10,491	435
183	32,569	17,913	10,271	22,298	1,642
184	17,159	13,156	8,735	8,424	4,421
185	180,874	155,789	139,949	40,925	15,840
186	196,298	106,634	79,571	116,727	27,063

APPENDIX F

Characteristics of Tape-to-Tape States

F.1 BACKGROUND: THE MEDICAID TAPE-TO-TAPE STATES

In this appendix we present information on the characteristics of the Tape-to-Tape States. One key reason why high volume and/or high payment procedures may differ from State to State is because of differences in Medicaid programs in terms of eligibility, coverage limitations, and other program characteristics such as utilization controls and reimbursement systems.

Key features of the Medicaid programs in Georgia, Michigan, and Tennessee, the States included in this analysis, are summarized below in order to provide information on possible sources of differences in high volume or high payment procedures in these three States. Characteristics for 1984 are described since the data used in the analysis are from 1984. The current Medicaid programs in these States may be different due to changes since that time.

F.1.1 Medicaid Eligibility Criteria

Differences in eligibility criteria exist among State Medicaid programs. All States with Medicaid programs are required to provide coverage to those "categorically needy" individuals qualifying for payments through the Aid to Families with Dependent Children (AFDC) program and most aged, blind, and disabled persons qualifying for Supplemental Security Income (SSI) payments. In addition to these persons, States have the option to provide income assistance, and thus Medicaid coverage, to other groups that qualify for assistance either categorically or through "medically needy" programs. Thus, Medicaid coverage above the minimum mandatory level varies considerably by State. Table F.1 provides specific eligibility information.

TABLE F-1
MEDICAID ELIGIBILITY

Eligibility	Georgia	Michigan	Tennessee
Mandatory AFDC:			
AFDC Cash Recipients	x	x	x
Families With Unemployed Parents	-	x	-
Pregnant Women With No Other Eligible Children	-	x	x
18 Year Olds In School	-	x	-
Indivs. <21 Not Qualified As Dependent Children	-	x	-
Those Denied AFDC Since Payment <$10/Mo.	x	x	x
Pregnant Women	x	x	x
Work Supplement Program Participants	-	-	-
Families Cut From AFDC Due To Incressed Earnings	x	x	x
Those Ineligible For AFDC Due to Rules Not Applicable Under Title XIX	x	-	x
1972 "Pass-Through" Groups	x	x	x
Adoption Assistance or Foster Care Payments	x	x	x
Mandatory SSI:			
Aged, Blind, Disabled	x	x	x
Aged, Blind, & Dissbled Rcvng. Supp. Pymnt.	-	x	-
Those Not Elig. For SSI Due To Rules That Do Not Apply Under Title XIX	-	-	x
Spouses of Aged, Blind, and Disabled	-	-	-
1972 "Pass-Through" Groups	x	x	x
1977 "Pass-Through" Groups	-	x	-

TABLE F-1
MEDICAID ELIGIBILITY (CON'T)

Eligibility	Georgia	Michigan	Tennessee
Optional AFDC:			
Eligible For But Not Receiving AFDC	-	-	-
Would Be Eligible If Not In An Institution	x	-	x
Would Be Eligible If Child Care Costs Were Paid From Earnings	-	-	-
Would Be Eligible If Coverage Were As Broad As Title IV-A	-	-	-
Individuals <21 Not Qualified As Dependent	x*	x	x*
Optional SSI:			
Those Eligible For But Not Receiving SSI	-	-	-
Institutionalized Individuals	x	-	x
Medically Needy:			
Medically Needy Program	-	x	x
Spend Down Time Period In Months	-	6	3
Allowable Resources (1 Person)	-	$1500	$1500

* Some of these children are eligible for Medicaid in TN and GA

Source: Eligibility requirements as of 3/31/84 taken from HCFA (1985)

There are several specific groups for which States have the option of declaring eligible for AFDC, and thus Medicaid. Three important groups are families with unemployed parents, pregnant women with no other eligible children, and 18 year olds in school. Of the three Tape-to-Tape States, Michigan provides the broadest eligibility for Medicaid assistance because Michigan covers all three groups. Tennessee only covers pregnant women with no other eligible children, and Georgia covers none of these groups. There are a few additional minor differences in AFDC eligibility, primarily regarding coverage of institutionalized persons, among these States.

Another source of eligibility differences which may affect the distribution of procedures is that "needs standards" (maximum income allowed to qualify for payments) for AFDC differ by State. The needs standards based on income level for Tennessee are lower than those for Georgia and Michigan.

Medicaid eligibility for SSI recipients among the three States is largely the same except for a few small differences. All three States deem SSI recipients eligible for Medicaid. However, persons receiving supplemental State payments in Michigan are also eligible for Medicaid, while in Tennessee and Georgia they are not.

In addition, Michigan and Tennessee also have "medically needy" programs whose recipients are eligible for Medicaid. Georgia did not have a "medically needy" program in 1984. These programs are for persons who would be categorically eligible with large medical bills but are above the needs standards for income.

F.1.2 Medicaid Coverage Limitations

Differences in coverage limitations among the States may also influence the volume and payment for various procedures. Table F.2 details coverage limitations in three States. A major coverage limitation potentially affecting the volume of certain procedures is the implementation of prior authorization programs. While Georgia's prior authorization program affects only inpatient procedures, Michigan's program covers inpatient and outpatient procedures. Georgia's prior authorization program began in 1982 for all elective procedures. Although Michigan has had a prior authorization requirement for hospital stays greater than 18 days since 1982, its mandatory prior authorization program for elective hospital admissions became effective in October 1984. Tennessee had no prior authorization program in 1984.

Another coverage limitation possibly affecting the volume of procedures is the lack of coverage for certain procedures in Georgia and Michigan. Georgia restricts coverage for specific procedures in the inpatient settings while Michigan restricts coverage for specific procedures in both the inpatient and the outpatient settings.

Mandatory second opinion programs represent another major coverage limitation affecting volume. Georgia did not have a program in 1984. Michigan has had a mandatory second opinion program since 1980 for selected procedures. Tennessee started its mandatory program for five surgical procedures in October 1984.

Other limitations that may affect payments include the following: Tennessee had a maximum limit of 14 covered inpatient days per recipient per year and a limit on the number of preoperative days; Michigan had restrictions to encourage outpatient treatment; and Georgia and Michigan did not cover some

TABLE F-2
MEDICAID COVERAGE LIMITATIONS

Limitation	Georgia	Michigan	Tennessee
Inpatient:			
Maximum Days Per Year	no limit	no limit	14
Prior Authorization For Specific Procedures	x	-	-
Second Opinion Program	-	x	-
Limits On Preoperative Days/Weekend Admissions	-	-	x
Specific Procedures Not Covered	-	x	-
Procedures That Could Be Done Outpatient Not Covered	-	x	-
Outpatient:			
Maximum visits per year	12	-	30
Some Procedures Not Covered	x	x	-
Prior Authorization For Certain Procedures	-	x	-
Specific Physicians' Services Not Covered	x	x	-

Source: HCFA (1985)

optional inpatient services and some physicians' services provided on an outpatient basis.

F.1.3 Other Medicaid Program Characteristics

Other sources of potential differences in Medicaid programs which may affect the volume and payment for various procedures are the variation in the distribution of recipients and expenditures by eligibility category, demographic characteristics, supply characteristics, payment mechanisms, and other program characteristics. Tables F.3 and F.4 summarize other Medicaid program characteristics for Georgia, Michigan, and Tennessee. Some of these differences, such as those related to the age and sex distribution of Medicaid recipients, were adjusted for in the analyses, as discussed in Appendix C. Other differences, such as those in supply characteristics and reimbursement methods, were not controlled for.

As can be seen in Table F.3, Michigan has a large Medicaid program (the sixth largest State Medicaid program in terms of the number of recipients). In 1984, the number of Medicaid recipients was 1.2 million in Michigan, 0.4 million in Georgia, and 0.3 million in Tennessee. For the same year, payments amounted to $1.6 billion in Michigan, $0.6 billion in Georgia, and $0.5 billion in Tennessee (HCFA, 1986a). Thus, average payments per recipient in 1984 amounted to $1363 in Michigan, $1385 in Georgia, and $1564 in Tennessee. While elderly SSI recipients comprised over 20 percent of recipients in Georgia and Tennessee in 1984, they accounted for less than 10 percent in Michigan. While AFDC recipients accounted for between 55 percent and 60 percent of recipients in Georgia and Tennessee, over 85 percent of total Medicaid recipients in Michigan were in the AFDC program. (Recall, however, that we included only the noncrossover population in our analysis.)

TABLE F-3
MEDICAID STATE AGGREGATE DATA

Element	Georgia	Michigan	Tennessee	United States
ENROLLEES:	555,480	1,457,279	422,740	n.a.
RECIPIENTS:				
Total	439,005	1,155,165	345,302	21,607,067
By Eligibility Category:				
Age 65+	91,527	87,889	73,606	3,238,272
Blind	2,958	2,070	2,684	79,161
Disabled	92,494	37,458	77,156	2,833,875
AFDC Children	178,887	655,355	135,755	9,683,933
AFDC Adults	97,131	362,611	53,156	5,599,701
Other Title XIX Recipient	1,355	60,911	2,945	1,186,715
By Type of Service:				
Inpatient Hospital	82,706	151,399	81,075	21,607,067
Physician Services	333,002	844,490	241,593	14,195,294
Outpatient Hospital	202,210	459,040	110,139	10,034,548
PAYMENTS ($):				
Total	607,953,151	1,574,044,207	540,169,728	33,890,946,432
By Eligibility Category:				
Aged 65+	219,011,494	378,019,702	195,490,773	12,815,368,638
Blind	5,381,831	5,407,549	3,742,080	218,920,752
Disabled	238,017,298	550,197,465	200,708,737	11,758,320,076
AFDC Children	61,844,306	240,875,944	82,345,189	3,978,546,701
AFDC Adults	83,234,057	345,899,480	55,053,928	4,419,758,723
Other Title XIX Recipient	464,164	53,644,067	2,829,021	700,031,544
By Type of Service:				
Inpatient Hospital	144,202,882	520,842,715	107,630,456	8,847,641,841
Physicians' Services	56,260,618	159,886,330	46,379,991	2,220,363,192
Outpatient Hospital	34,469,954	80,942,888	27,569,666	1,646,312,167

Sources: HCFA (1986a);
Dodds et al. (1987).

TABLE F-4
MEDICAID STATE PROGRAM CHARACTERISTICS

CHARACTERISTICS	Georgia	Michigan	Tennessee
Year of Change To Alternative Reimbursement	1983	1980	1983
Method Of Payment	per case	per diem	per diem
Inpatient Hospital Expenditures, ($ mil.) FY 1983	151.1	449.2	112.4
Average Payment Per Inpatient Recipient Fiscal Year 1983	1244	2901	1297
Total Inpatient Days Of Care (thousands) Fiscal Year 1983	506	1154	394
Average Length of Stay Per Inpatient Fiscal Year 1983	4.2	7.5	4.4
Average Payment Per Inpatient Day	298.41	389.41	285.00
Ratio Of Medicaid Recipients To Persons Below Poverty Level, FY 1982	0.31	0.72	0.28
Average Payment/ Recipient ($) FY82	1301	1100	1279
Medicaid Certified Inpatient Beds	25438	39745	27882
Enrolled Physicians/1000 Enrollees	32.08	12.49	12.22
Participating Physicians/1000 Enrollees	24.93	not avail	8.74
Hospital Beds/1000 Recipients	57.66	33.46	81.70

Source: HCFA (1985)

Demographic characteristics of Medicaid recipients differ among the States as well (HCFA, 1987b). In fiscal year 1983, the Michigan Medicaid recipient population was younger (62 percent under age 21) than that of Georgia (45 percent under age 21) or Tennessee (43 percent under age 21). Michigan and Tennessee had a higher percentage of whites (62 percent and 57 percent, respectively) than Georgia (35 percent). The distribution by sex was similar in all three States (33 percent male in Georgia, 39 percent in Michigan, and 34 percent in Tennessee).

Another difference which can affect comparisons of payments for procedures lies in the methods of reimbursement for Medicaid services. For example, as can be seen in Table F.4, Georgia reimbursed inpatient Medicaid services on a per case basis in 1984. Michigan and Tennessee reimbursed providers of inpatient services on a per diem basis. Fee schedules also will differ by State. Thus, for all of the above reasons, it is difficult to compare payments across States.

Supply characteristics vary by State. For example, the number of enrolled physicians per 1,000 enrollees was almost three times as great in Georgia as it was in Michigan and Tennessee. The number of Medicaid certified inpatient beds per 1,000 enrollees was 82 in Tennessee while the number was 58 in Georgia and 33 in Michigan (HCFA, 1985).

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